State of Utah

JON M. HUNTSMAN, JR.
Governor

GARY R. HERBERT
Lieutenant Governor

Department of Administrative Services
D'ARCY DIXON PIGNANELLI
Executive Director

Division of Facilities Construction and Management
F. KEITH STEPAN
Director

ADDENDUM #1

Date: 30 May 2006

To: Contractors

From: Daniel Clark, DFCM – Project Manager

Reference:

Utah Valley State College
Lot 'V' Parking Improvements
DFCM PROJECT NO. 06227790

Subject: **Addendum No. 1**

Pages		
	Cover Page	1 page
	Updated Specifications and Drawings	87 page
	Total	**88pages**

Note: This Addendum shall be included as part of the Contract Documents. Items in this Addendum apply to all drawings and specification sections whether referenced or not involving the portion of the work added, deleted, modified, or otherwise addressed in the Addendum. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.

1.1 **SCHEDULE HAS NOT BEEN CHANGED**

1.2 Specifications and Drawings have been updated

INDEX TO TECHNICAL SPECIFICATIONS

Civil Specifications

Landscape Specifications

Electrical Specifications

CIVIL SPECIFICATIONS

SECTION 02061

SELECT AGGREGATE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Select fill materials and procedures.

1.2 RELATED SECTIONS

A. Section 02075: Geotextiles

B. Section 02511: Asphalt Paving

1.3 DEFINITIONS

A. Select fill: Aggregate materials meeting requirements of this Section.

1.4 QUALITY ASSURANCE

A. Remove products found defective after installation and install acceptable products at no additional cost to the State.

1.05 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

A. **Furnish and Install 2' of Compacted Select Fill and Ground Stabilization Fabric**. Measurement and payment will be based upon the in-place square footage of select fill furnished and placed and compacted to a 2' depth and woven geotextile fabric furnished and installed in accordance with the plans and these specifications. Payment shall include the cost for all materials, labor, tools, equipment, etc. to complete this work.

PART 2 PRODUCTS

2.1 STRUCTURAL FILL FOR PAVED AREAS

A. Shall be untreated natural stone

1. Shall not be lumpy or frozen.

2. Shall be free from noticeable concentrations of alkali, salt, shale, and petroleum products, all roots, sod, limbs, and other vegetative matter, slag, cinders, ashes and rubbish, or other material that, in the opinion of the Engineer, is objectionable or deleterious.

3. Shall be graded within the following limits: Use the following gradations:

TABLE 2

Paved Area Select Fill	
Sieve Size	Percent passing
4"	100
2"	70-95
3/4"	45-95
#4	28-75
#10	20-62
#40	5-40
#200	0-15

PART 3 EXECUTION

3.1 INSTALLATION

A. Select Fill:

1. Overexcavate area under future pavement to a 2' depth beneath bottom of pavement section (asphalt and roadbase).
2. Place woven ground stabilization geotextile fabric in accordance with manufacturers recommendations. See Section 02075 Geotextiles.
3. Place and compact select fill in 4 - 6 inch lifts above fabric for a total of 2' of compacted select fill.
4. Compact backfill material in 6 inch layers to a 96 percent density when placing the fill under paved areas.

END OF SECTION

SECTION 02075

GEOTEXTILES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Materials and procedures for installing geotextiles of the type(s) shown on the drawings, and at other locations as directed by the Engineer.

1.2 RELATED SECTIONS

A. Section 02061: Select Aggregate

1.3 REFERENCES

A. AASHTO M 288: Geotextile Specifications for Highway Applications.

B. ASTM D 4791: Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

1.4 SUBMITTALS

A. Submit prior to use: Manufacturer's certificate that each fabric complies with requirements of this Section.

1.5 SAMPLING AND TESTING

A. Not Used

1.6 PACKAGING, SHIPPING, AND STORING

A. Protect the geotextile from direct sunlight, chemicals, mud, dirt and debris during shipment and storage. Replace at the Contractor's sole expense, any geotextile damaged or deteriorated during shipping, storage or construction.

B. Labeling and Tagging:
   1. Identify each package by a tag or label securely affixed to the outside of the roll on at least one end.
   2. Provide the following required information on the tag:
      a. Name of the geotextile manufacturer
      b. Brand name of the product, width, length, and package weight of geotextile

1.7 ACCEPTANCE

A. DFCM will reject geotextile at installation if it has defects, rips, holes, flaws, deterioration, or damage incurred during manufacture, transport, handling or storage.

PART 2 PRODUCTS

2.1 STABILIZATION GEOTEXTILE

A. Furnish a woven geotextile material as approved by Engineer.

PART 3 EXECUTION

3.1 GENERAL

A. Place geotextile on areas that are smooth, and free of projections or depressions. Do not drag the geotextile across the subgrade.

B. Do not operate construction equipment or traffic directly on geotextile.

C. When placed for construction, cover the geotextile with indicated cover material as soon as possible. Do not leave uncovered for more than 5 days.

D. Place cover material on the geotextile in a manner that the geotextile is not torn, punctured, or shifted.

E. Limit construction vehicles in size and mass so rutting in the initial layer above the geotextile is not more than 3 inches deep, or half the layer thickness, whichever is the lesser. Turning of vehicles on the first layer is not permitted.

3.2 INSTALLING STABILIZATION GEOTEXTILE FABRIC

A. Install Stabilization Geotextile under all structural fill as required by the drawings and specifications.

B. Unless otherwise specified, overlap the geotextile a minimum of 2 feet at all longitudinal and transverse joints.

C. For placement on slopes, overlap each sheet over the next downhill sheet.

D. Repair: Place patch over damaged area and extend 3 feet beyond the perimeter of the tear or damage.

E. Place fill, beginning with the sheet(s) overlapped above subsequent sheet(s), to hold geotextile in place.

F. Pins, usually 18 inches long, may be helpful in securing the geotextile during installation.

END OF SECTION

SECTION 02100

SITE PREPARATION

PART 1 GENERAL

1.01 WORK INCLUDED

A. Preparation

B. Asphaltic concrete pavement removal

C. Portland cement concrete removal

D. Disposal of waste materials

1.02 QUALITY ASSURANCE

A. Not Applicable

1.03 MEASUREMENT AND PAYMENT

A. **Remove and Dispose of Existing Asphalt Off Site**. Measurement and payment for this bid item will be based upon the in-place square footage of asphalt surface course and base course removed and disposed of at an approved facility off-site. Payment shall include the cost of all labor, materials, tools, machinery, permits, etc. to complete this work.

B. **Remove and Dispose of Concrete Curb and Gutter**. Measurement and payment for this bid item will be based upon the in-place lineal footage of concrete curb and gutter removed and disposed of at an approved facility off-site. Payment shall include the cost of all labor, materials, tools, machinery, permits, etc. to complete this work.

C. **Saw Cut Asphalt.** Measurement and payment shall be based upon the total lineal footage of existing asphalt pavement saw cut to a one inch depth. Such payment shall include all labor, tools, equipment and material needed to complete this work.

D. **Remove and Dispose of Existing Sod and Material Off Site Complete**. Measurement and Payment for this bid item shall be based upon the in-place cubic yardage of sod, natural material, refuse, concrete culverts, abandoned boxes, etc, excavated, removed and disposed of off site. Such payment shall include the cost of all labor, materials, tools, machinery, permits, etc. to complete this work.

E. **Furnish and Install Soil Stearilent**. Measurement and payment for this bid item will be based upon the in-place square footage of water soluble herbicide for non-selective control of annual and perennial weeds in strict accordance with manufacturers instructions and all laws and regulations. Payment shall include the cost of all labor, materials, tools, machinery, permits, etc. to complete this work.

F. **Adjust Existing Utilities**. Measurement for this bid item will not be taken. Payment for this bid item will be based upon the lump sum bid amount and shall cover the cost of relocating any utility mains or services including water, sewer, electrical, communication, fiber optic, or any other such utility that may require relocation as part of this project including adjusting the grade of

grates, lids, etc. Payment shall include the cost of all labor, materials, tools, machinery, permits, etc. to complete this work.

G. **Clear and Grubb Including Trees, Culverts, Boxes, Complete, Etc.** Measurement for this bid item will not be taken. Payment for this bid item will be based upon the lump sum bid amount and shall cover the cost of all organic material, trees, shrubs, weeds, bushes, existing culverts, boxes, etc. removed and disposed of at an approved facility off-site. Payment shall include the cost of all labor, materials, tools, machinery, permits, etc. to complete this work.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 PREPARATION

A. No clearing, demolition, or removal of any kind shall proceed until all existing trees, improvements, etc. to be removed have been established and are inspected and documented by the Owner.

B. Establish necessary clearing limits within the construction limits. Mark all trees, shrubs, structures, fences, concrete, and other improvements to be removed.

C. Trees, shrubs and lawn, areas to receive planting, rock outcroppings, fences, sprinklers and other improvements that are not to be removed shall be protected from damage or injury. If damaged or removed, they shall be restored or replaced in as nearly the original condition and location as is reasonably possible. Trees, shrubs, and improvements not to be removed shall be marked in field by Owner and/or shown on the Drawings.

D. Give reasonable notice to Owner to permit him to salvage plants, trees, fences, sprinklers and other improvements within the construction limits that may be destroyed because of the work.

E. Notify all utility companies to be present if disturbing ground in the vicinity of utilities. Contractor shall pot hole and verify the locations and bury depths of all utilities including water, storm drain, telephone, gas and electrical before digging. All Utility relocations shall be done in accordance with the owners and operators standards and requirements.

G. Protect active utility systems adjacent to or uncovered by any excavation during site preparation.

H. Maintain benchmarks, monuments and other reference points and construction stakes.

3.02 ASPHALTIC CONCRETE PAVEMENT REMOVAL

A. Sawing shall be used to ensure the breakage of pavement along straight lines.

3.03 DISPOSAL OF WASTE MATERIALS

A. Where salvage is not required as otherwise specified herein or as shown on the drawings, dispose of all removed materials at a suitable off-site location in accordance with applicable laws and ordinances.

B. No burning shall be allowed.

END OF SECTION

SECTION 02230

BASE COURSE

PART 1 GENERAL

1.01 WORK INCLUDED

A. Subgrade preparation to lines and grades shown on the plan.

B. Place, grade and compact base and sub-base course materials.

C. Dust and surface water control.

1.02 RELATED WORK

A. Section 02511 - Asphaltic Concrete Paving

1.03 REFERENCES

A. American Society for Testing Materials (ASTM).

B. American Association of Safety and Highway Transportation Officials (AASHTO)

1.04 METHOD OF MEASUREMENT AND BASIS FOR PAYMENT

A. **Furnish and Install 8" of Compacted Road Base.** Measurement and payment shall be based upon the total square footage of 8" of compacted road base furnished and installed according to the plans and specifications. Such payment shall include all labor, tools, equipment and material needed to complete this work.

PART 2 PRODUCTS

2.01 BASE COURSE MATERIAL

A. Road Base for Pavement Preparation:

1. Shall be untreated natural stone

2. Shall not be lumpy or frozen.

3. Shall be free from noticeable concentrations of alkali, salt, shale, and petroleum products, all roots, sod, limbs, and other vegetative matter, slag, cinders, ashes and rubbish, or other material that, in the opinion of the Engineer, is objectional or deleterious.

4. Shall be graded within the following limits:

Sieve Size	Percent Passing By Weight
1"	100
1/2"	70-100
No. 4	41-68
No. 16	21-41
No. 40	10-27
No. 200	4-13

PART 3 EXECUTION

3.01 PREPARATION OF SUBGRADE

A. Prior to placing base course materials, the subgrade shall be scarified to a depth of not less than 6", moistened or dried to optimum moisture content, and compacted to at least 95% maximum Modified Proctor Density as determined in accordance with ASTM D1557 (AASHTO T-180), and shall be within 2% of optimum moisture content.

B. The subgrade shall then be proof rolled.

C. If excessively soft, loose, or disturbed soils are encountered, they shall be removed as directed by the Engineer to a maximum depth of two feet (2') and replaced and recompacted to 96% maximum Modified Proctor Density using approved subgrade stabilizing material.

D. Ensure subgrade is to required lines and elevations.

3.02 PLACEMENT OF BASE COURSE

A. Protect against "pumping" moisture to surface by limiting travel on exposed subgrade. Where it is determined by the Owner that construction vehicle traffic (other than proof rolling) has caused subgrade instability, remove disturbed soils and replace with sand backfill at no additional cost to the Owner.

B. Apply water soluble herbicide for nonselective control of annual and perennial weeds in strict accordance with manufacturers instructions and all laws and regulations.

C. Place base course material on the prepared and accepted subgrade. The material shall be back-dumped and spread in a uniform lift thickness.

D. Handle and spread materials in a manner that will prevent segregation of sizes. When vibrating or other acceptable types of compaction equipment are used, the entire course shall be compacted in 2-4" lifts.

E. When base course is constructed in more than one layer, the previously placed layer shall be cleaned of loose and foreign matter. Upper layer of base course shall not be less than 1-1/2", nor shall fine materials be added to reach final grade.

F. Overstressing the subgrade soil and base course shall be avoided by utilizing equipment in spreading and dumping that exerts only moderate pressures on the soil. Avoid excessive travel on lower base course lifts. Severe rutting, cracking or yielding is an indication of overstressing the soil. Any ruts or cracks which develop in the base course during spreading or compacting shall be repaired as directed at no additional cost to Owner.

G. Base course shall be compacted to no less than 95% maximum Modified Proctor Density, as determined by ASTM D1557 (AASHTO T-180). Moisture content shall be maintained to within 1.5% of optimum throughout placing and compaction operations.

1. Compaction shall always be commenced along the edge of the area to be compacted and the roller shall gradually advance toward the center of the area to be compacted.

2. Compaction equipment shall be operated along lines parallel or concentric with the centerline of the road being constructed, and no material variation therefrom will be permitted.

H. Base course shall be substantially true to line and grade as indicated on the drawings. The surface shall be within 1/2" of required grade. Completed thickness of base course shall be within 1/2" of indicated thickness, with average thickness not less than that indicated.

I. The top surface of compacted base course shall be finished by blading or rolled with equipment designed for that purpose.

J. Temporary Graded Surface

1. When allowed by the local jurisdiction having authority, where trenches are excavated in paved traffic lanes, the surface course may be temporarily replaced by a surface consisting of base course material. The base course shall be removed and replaced with pavement as soon as conditions permit, or as required by local jurisdiction having authority.

2. The surface shall be maintained to provide for a smooth flow of traffic without holes, bumps, etc., until final acceptance of the work.

3.03 DUST AND SURFACE WATER CONTROL

A. Dust control measures shall be implemented by application of water to all work areas, storage areas, haul and access roads, or other areas affected by work.

B. All work shall be in compliance with the Federal, State and local air pollution standards, and not cause a hazard or nuisance to personnel and the public in the vicinity of the work.

C. Provide and operate at least one (1) mobile tank sprinkling unit during the contract period.

D. Other methods of dust control for haul and access roads may include chemical treatment, light bituminous treatment or other method as approved by the Owner.

E. Surface water shall be controlled to the extent that the areas to receive pavement, walks or slabs are not allowed to become wet from runoff from adjacent areas. Surface water shall be directed away from these areas but not directed toward adjacent property, buildings, or any improvement that may be damaged by water. Surface water shall not be allowed to enter sanitary sewers.

3.04 FIELD QUALITY CONTROL

A. Testing and inspection of placed Base Course will be provided by the Owner. Tests provided by the Owner are as follows:

Item	Type	Frequency
Base Course Aggregate Sampling	ASTM D75	Each day or 1 test/500 sq. yd., or as required.
Atterberg Limits	ASTM D2419, D423, and D424	As required

Sieve Analysis	ASTM C136	As required
Bearing Ratio	ASTM D1883	As required
Maximum Density	ASTM D1557, Method D	As required
In-place Density	ASTM D2167, D2922 and D3017	As required

B. If tests indicate that sub-base and/or base course do not meet specified requirements, remove defective work, replace and retest at no cost to Owner.

END OF SECTION

SECTION 02511

ASPHALTIC CONCRETE PAVING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Proof roll base course to reveal soft and yielding spots.

B. Place and compact asphaltic concrete paving.

C. Protection of newly placed pavement.

1.02 RELATED WORK

A. Section 02230 - Base Course

1.03 QUALITY ASSURANCE

A. Do not place asphaltic concrete paving when the air temperature in the shade and/or the roadbed temperature are below 50˚ F, or during rain, when the base course surface is wet, or during other adverse weather conditions.

B. Do not place tack coat when air temperature in the shade and the roadbed temperature are below 50˚ F, or during rain, fog, or other adverse weather conditions.

C. All work shall be performed by experienced and qualified workmen with equipment standard with the industry.

D. Approval by Engineer of sources of supply of materials shall be obtained prior to delivery of materials.

E. Comply with federal, state and/or local codes and regulations.

1.04 REFERENCES

A. American Society for Testing Materials (ASTM):

1. D1557, "Tests for Moisture - Density Relationship of Soils using 10 lb (4.5 kg) Rammer in 18 inch (457 mm) Drop".

2. D1559, "Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus".

3. D2041, "Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures".

4. D2170, "Kinematic Viscosity of Asphalts (Bitumens)".

B. THE ASPHALT INSTITUTE (A.I.) Specification Series No. 2 (SS-2).

C. American Association of State Highway and Transportation Officials (AASHTO):

1. Materials and compaction tests.
   a. AASHTO T-180

D. State of Utah Standard Specifications for Road and Bridge Construction, latest edition including Supplement #2.

1. Section 704.03 Asphaltic Cement.

1.05 SUBMITTALS

A. An asphaltic concrete paving mix design prepared by a certified laboratory and materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements shall be submitted for review and approval at least two weeks prior to commencement of the work.

B. Written certification of compliance for pavement marking paint.

1.06 WARRANTY

A. See General Conditions.

1.07 METHOD OF MEASUREMENT AND BASIS FOR PAYMENT

A. **Furnish and Install 3" of compacted Asphalt.** Measurement sand payment shall be based upon the square footage of actual asphalt installed and compacted to a 3" thickness according to the plans and specifications. Such payment shall include all labor, tools, equipment and material needed to complete this work.

PART 2 PRODUCTS

2.01 MATERIALS

A. Asphaltic cement:

1. Viscosity Graded original, AC-10, conforming to requirements of ASTM D-3381 (AASHTO M-226, Table 2), and Section 704.03 - State of Utah Standard Specifications for Road and Bridge Construction.

2. Shall not foam when heated to 350˚ F.

B. Mineral aggregate:

1. Shall consist of crushed stone, crushed gravel, or crushed slag, or a combination thereof; free of clay, silt, organic matter or other deleterious materials.

2. Gradation shall be in accordance with the following:

a. Asphaltic concrete surface course:

Sieve Size	Percent Passing by Weight
1/2"	100
#4	55 - 85
#16	24 - 38
#50	9 - 21
#200	4 - 8

3. Course aggregate, retained on the No. 4 sieve shall consist of clean, hard, rough, durable and sound fragments, with not less than 50 percent of particles by weight with at least one mechanically fractured face or clean angular face.

4. Fine aggregate passing the No. 4 sieve may be either a natural or manufactured product. The aggregate shall be clean, hard grained and moderately sharp, and shall contain not more than 2 percent by weight of vegetable matter or other deleterious substances.

5. That portion of the fine aggregate passing the No. 40 sieve shall be nonplastic when tested in accordance with ASTM D-424.

6. The weight of minus 200 mesh material retained in the aggregate, as determined by the difference in percent passing a No. 200 sieve by washing and dry sieving without washing, shall not exceed 6 percent of the total sample weight. That portion of fine aggregate passing the No. 200 sieve shall be determined by washing with water in accordance with ASTM C-117.

7. The aggregate shall be of uniform density and quality and shall have a rodded weight of not less than 100 pounds per cubic foot when tested in accordance with ASTM C-29.

8. The aggregate shall have a percentage of wear not exceeding forty when tested in accordance with ASTM C-131 and C-535.

9. The aggregate shall have a weighted loss not exceeding 12 percent by weight when subject to five cycles of sodium sulfate and tested in accordance with ASTM C-88, D-1073, and D-692.

2.02 ASPHALTIC CONCRETE PAVING MIXTURE

A. Combine mineral constituents and asphalt cement in proportions per mix design at a central plant to produce an asphaltic concrete pavement mix.

B. The asphaltic cement shall be heated at the mixing plant to a temperature at which it can be applied uniformly to the aggregate.

C. Coarse and fine aggregate shall be stored separately at the mixing plant in a manner that will prevent intermingling.

D. When it is necessary to blend aggregates from one or more sources to produce the combined gradation, each source or size of aggregate shall be stockpiled individually. Aggregate from the individual stockpiles shall be fed through separate bins to the cold elevator feeders. They shall not be blended in the stockpile.

E. Cold aggregates shall be fed carefully to the plant so that surpluses and shortages will not occur and cause breaks in the continuous operation.

F. The aggregate shall be dried and heated to provide a paving mixture temperature in conformance with placing conditions, but not to exceed 163˚C (325˚F).

G. The heated and dried aggregates shall not contain enough moisture to cause the mixture to slump, the asphalt to foam, or the aggregate to segregate during hauling and placing.

H. The shortest mixing time consistent with satisfactory coating of the aggregate shall be used. The mineral aggregate shall be considered satisfactorily coated with asphaltic cement when all of the particles passing the No. 4 sieve and 96 percent of the particles retained on the No. 4 sieve are coated with asphaltic cement. The required mixing time, as determined above, shall be in accordance with ASTM D-2489.

I. If a dryer drum mixing process is used, the mineral aggregate shall be considered satisfactorily coated with asphaltic cement when all of the particles passing the No. 4 sieve and 98 percent of the particles retained on the No. 4 sieve are coated with asphaltic cement. The moisture content of the asphaltic cement sampled behind the laydown machine prior to compaction shall not exceed 1 percent by weight.

2.03 TACK COAT

A. Emulsified asphalt CSS-1H or SS-1H.

2.04 SUBGRADE STABILIZING MATERIALS

A. Shall be select aggregate material as specified in Section 02061.

PART 3 EXECUTION

3.01 PREPARATION

A. Proofroll base course surface. Replace wet, spongy, soft, uncompactable or other unsuitable material with new base course material at no additional cost. Finish and compact repaired area as specified in Section 02230 - Base Course.

B. Ensure base course surface is to required elevation. Remove loose material from base course surface.

C. Do not place prime coat or asphaltic concrete paving until base course installation has been approved by the Construction Manager.

3.02 TRANSPORTING THE ASPHALTIC CONCRETE PAVEMENT

A. Transport time from the mixing plant to the job site shall not exceed 1 hour.

B. Hauling truck shall have no direct frame contact with the paver or bear down on the paver during dumping operations.

3.03 TACK COAT

A. Prior to placing pavement, tack coat shall be applied to the vertical edges of concrete and "cold" pavement (over 1/2 hour old) which will be in contact with new pavement. Tack coat shall extend 12 inches onto adjacent base course material. The tack coat shall be carefully applied at a rate of 0.15 gal/SY. Tack coat shall also be applied uniformly at the same rate to the horizontal top surface of each lift of bituminous pavement prior to placing the next lift of bituminous pavement to promote a bond between the two courses of pavement. None of the material shall penetrate into the pavement and for this reason the application should be limited.

B. Prior to applying the material, the surface to be treated shall be swept or flushed free of dust or other foreign material.

C. Protect all surfaces not required to receive tack coat from any inadvertent application.

D. The temperature range of the tack coat at the time of application shall be such that the viscosity will be between 50 and 100 centistokes as determined in accordance with ASTM Designation D-2170.

E. Under no circumstances shall traffic be permitted to travel over the tacked surface. If detours cannot be provided, restrict operation to a width that will permit at least one-way traffic over the remaining portion of the roadbed. If one-way traffic is provided, the traffic shall be controlled in accordance with governing authority.

F. After application of tack coat, sufficient time shall be given to allow for complete separation of asphalt and water before paving operations begin. The tack coat shall be applied on only as many surfaces as will be paved against in the same day.

3.04 PLACEMENT OF ASPHALTIC CONCRETE PAVEMENT

A. Place asphalt pavement to provide a compacted depth as indicated on the plans. Placing the pavement shall be a continuous operation. The machine shall spread mixture and shall strike a finish that is smooth, true to cross section, uniform in density and texture, and free from hollows and other irregularities. If any irregularities occur, they shall be corrected before final compaction of the mixture. The paving machine shall be self-propelled, equipped with hoppers, distributing screws, adjustable screeds and equalizing devices, capable of spreading hot asphaltic concrete paving mixtures without tearing, shoving or gouging, and of producing a finished surface of specified quality. Place inaccessible and small areas by hand.

B. Ensure joints made during paving operations are straight, clean, vertical and free of broken or loose material. Carefully make joints to insure a continuous bond between old and new pavement, or between successive day's work. A continuous bond between adjoining work is required.

C. If more than 1/2 hour elapses between adjacent paving passes, the "cold joint" shall have tack coat applied to the "cold" pavement prior to placing the adjacent pass.

3.05 COMPACTION

A. Roll and compact to specified density before temperature of the mixture drops below 180˚F.

B. Compact asphalt paving course to required density, with a steelwheeled tandem roller, steel three-wheeled roller, vibratory roller, or a pneumatic-tired roller, weighing not less than five tons. Start compaction as soon as pavement will bear equipment without checking or undue displacement. Speed of roller shall be slow enough to avoid displacement of hot mixture, and any displacements occurring as a result of changing the direction of the roller, or from any other cause, shall at once be corrected by the use of rakes and of fresh mixture where required. Ensure each pass of roller overlaps previous passes by at least 1/2 of the roller width to ensure smooth surface free of roller marks. Keep roller wheels sufficiently moist so as not to pick up material. Rolling shall continue until roller marks are eliminated and no further compression is possible. The finished compacted pavement shall have a density of 96% minimum, (no test less than 93% of the density determined in accordance with ASTM D-2041), as determined by ASTM D1557.

C. Leave pavement with a uniform, dense surface.

D. Perform hand tamping in areas not accessible to rolling equipment. Thorough compaction must be achieved, and joints between curbs, headers, manholes and similar structures must be effectively sealed.

E. Do not allow vehicular traffic on newly paved areas until surface has cooled to atmospheric temperature.

END OF SECTION

SECTION 02525

NEW CONCRETE

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide all equipment, materials, labor, tools, and transportation and other items required to provide and install subgrade preparation, drainage course placement, formwork, and placement and finishing of portland cement concrete curbs, gutters, walks and drive aprons.

B. Protection of newly constructed curbs, gutters, drive aprons and walks.

C. Curing provisions.

1.02 RELATED WORK

A. Section 02230 - Base Course

B. Section 03200 - Concrete Formwork

C. Section 03300 - Cast in Place Concrete

1.03 QUALITY ASSURANCE

A. Use workmen thoroughly trained and experienced in placing and finishing the type of work specified.

B. Comply with applicable federal, state, and local codes and regulation.

C. Comply with hot or cold weather requirements.

D. Concrete work shall be warranted against defects in materials or workmanship for a period of two (2) years, subject to applicable laws and regulations. In no case shall the Work be warranted for less than one (1) year.

1.04 REFERENCES

A. American Concrete Institute (ACI)

1. Manual of Concrete Practice, 1985, Part 2:
   a. ACI 305R-77- Hot Weather Concreting
   b. ACI 306R-78 - Cold Weather Concreting
   c. ACI 318 - Building Code Requirements

B. American Society for Testing and Materials (ASTM)

1. D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction

2. C150 - Portland Cement

3. C33 - Concrete Aggregates

4. C94 - Ready Mixed Concrete

C. American Association of State Highway and Transportation Officials (AASHTO)

D. Federal Standard (FS)

1.05 SUBMITTALS

A. Submit concrete trip tickets to Owner's representative at the time of delivery to the site.

B. Submit mix design in accordance with Section 03300.

C. Submit construction, expansion, and contraction joint layout plan for approval.

D. Submit manufacturers data for all products proposed.

1.06 METHOD OF MEASUREMENT AND BASIS FOR PAYMENT

A. **Furnish and Install Concrete Curb and Gutter With Base**. Measurement and payment will be based upon the in-place lineal footage of 24" wide concrete curb and gutter installed with 4" of compacted untreated base course. Such payment shall include the costs of compacted road base material, fiber mesh reinforcement, and all labor, materials, tools and equipment needed to complete this work.

1.07 DELIVERY AND HANDLING

A. Ready mixed concrete shall be delivered to the site only in such quantities as are required for immediate use. The maximum allowable time between charging of the material in the mixing drum and final placing shall be not more than ninety (90) minutes when ambient temperatures are below 80˚ F and not more than sixty (60) minutes when ambient temperatures are above 80˚ F.

B. Concrete which has reached initial set prior to placement, or retempered concrete is not acceptable, shall not be used in the Work, and shall be promptly removed from the project site.

1.08 PROJECT CONDITIONS

A. Concreting operations shall not be performed when air temperature at the project site falls below 40˚ F.

B. Concreting operations shall not be performed when air temperature at the project site rises above 105˚ F.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS AND MIXTURE

A. Shall be in accordance with Section 03300.

B. Cement shall comply with the requirements of ASTM C150, Type II.

C. Coarse Aggregate shall comply with the requirements of ASTM C33 and Section 03300 of these specifications.

D. Fine Aggregate shall comply with the requirements of ASTM C33 and Section 03300 of these specifications.

E. Admixtures shall not be allowed in portland cement concrete with the following exceptions:

1. Air Entraining Admixture shall comply with the requirements of ASTM C260.

F. Concrete curing compound shall comply with ASTM C309, Type II, Class A and shall restrict moisture loss to 0.055 gr./sq.cm when applied at a rate of 200 sq.ft./gal.

G. Mix design shall comply with Section 03300 of these specifications.

2.02 JOINT MATERIALS

A. Filler material shall be pre-formed, non-extruding resilient type conforming to the requirements of ASTM D544 of appropriate thickness to fill joint.

B. Joint sealant shall be polyurethane based, self leveling, one part elastomeric sealant complying with the requirements of FS-TT-S00230 Class A, Type I unless Type II is recommended for the intended application by the sealant manufacturer.

C. Select joint materials of sufficient strength, hardness and durability to withstand stiletto heel traffic without damage or deterioration.

2.03 REINFORCEMENT

A. Reinforcement shall comply with the requirements of Section 03100 of these specifications.

2.04 FORMWORK

A. Formwork shall comply with the requirements of Section 03200 of these specifications.

2.05 EQUIPMENT

A. Equipment for placing concrete shall comply with the requirements of Section 03300 of these specifications.

PART 3 EXECUTION

3.01 PREPARATION

A. Remove all wood scraps, ice, snow, frost and debris from the areas in which concrete will be placed. Concrete shall not be placed on frozen ground or in standing water.

B. Thoroughly clean the areas to ensure proper placement and bonding of concrete.

C. Thoroughly wet the forms (except in freezing weather), or oil them; remove all standing water.

D. Thoroughly clean all transporting and handling equipment.

E. Notify the Owner at least 24 hours before placing concrete.

F. Obtain the Engineer’s approval of location of construction, expansion, or control joints prior to the start of concrete placement.

G. Verify that reinforcement is free of loose mill scale, mud, paint, oil, grease, or other materials which may hinder proper bonding of concrete to reinforcement.

3.02 PLACING STEEL REINFORCEMENT

A. Not Used

3.03 PLACING CONCRETE

A. Concrete shall be placed in accordance with the requirements of Section 03300 of these specifications.

3.04 CURB AND GUTTER JOINTS

A. Make all joints perpendicular and straight.

B. Joints for existing structures or paving removed or damaged as a result of the Work shall be replaced, matching joints in original structure as closely as possible.

C. Expansion Joints

1. Expansion joints in sidewalks shall be one half inch (½") in thickness and shall be placed where sidewalk joins existing walks, fixed objects, and at curbs at all handicap ramps using premolded expansion joint filler. Expansion joints shall not be spaced greater than 50' on center. Dowel bars are not required at expansion joints unless indicated on the drawings.

2. Expansion joints in curb and gutter shall be one half inch (½") in thickness and shall be placed between curb and gutter and storm drain structures, at changes in direction, or at intervals not exceeding 50' using premolded expansion joint filler.

3. Joint sealant shall be installed over all expansion joints. Provide and install bond breaker per the manufacturer's recommendations.

D. Contraction Joints

1. Curb and Gutter and Waterway

a. Contraction joints shall be installed according to the approved joint plan using steel templates not less than 1/8" nor more than 3/16" in thickness.
b. Remove steel templates once concrete has reached initial set.
c. Curb and gutter placed by slipform methods shall have joints installed every 10' by cutting into fresh concrete to a depth not less than 1-1/2". Round such joints to provide a neat workmanlike appearance.

E. Inspect joints upon removal of forms to verify that concrete or mortar has not sealed across the joint. Cut neatly and remove any such concrete or mortar in the joint.

3.05 HOT WEATHER CONCRETING

A. Hot weather concreting shall be performed in accordance with Section 03300 of these specifications.

3.06 COLD WEATHER CONCRETING

A. Cold weather concreting shall be performed in accordance with Section 03300 of these specifications.

3.07 FINISHING

A. Concrete surfaces shall be finished smooth and true to grade by float. The finishing shall commence immediately after the concrete is placed and shall progress at a rate equal to the paving operation. Any delay in excess of thirty minutes in performing the preliminary finishing shall constitute cause for shutting down the mixing operations until the finishing is resumed.

B. Hand methods of strike off and consolidation will only be permitted when the width of pavement to be constructed is less than 10 feet or at rounded intersection where the use of machine finishing is impractical.

C. While the concrete is still plastic the entire slab surface shall be tested by the Contractor for trueness with an accurate 10 foot straightedge. Any depressions found shall be immediately filled with fresh concrete, struck off, reconsolidated, and finished. High spots shall be struck off and refinished.

D. In advance of curing operations the pavement shall be textured by brooming. Owner shall be notified 24 hours in advance of placing and brooming operations in order to be present to review and recommend modifications to placement and finishing.

E. Finished Surface

1. The finished surface shall be true to grade and cross section, free from ruts, humps, depressions or other irregularities. The surface shall not deviate from line and grade by more than 1/8" in 10'. The determination of compliance with smoothness may be made with a straightedge or string line at the option of the Engineer. Any irregularities found shall be corrected by the Contractor using suitable grinding or grooving tools and equipment.

2. The grinding tool shall consist of a machine equipped with cutting wheels mounted on a horizontal shaft. The grinding action shall be conducted parallel to the centerline.Grinding operations may be deferred, as directed by the Engineer, whenever tearing of aggregate with the surface occurs and shall not be resumed until the concrete has hardened sufficiently to avoid tearing.

3. The finished surface across contact joints shall not deviate from a straight line by more than 1/8" in 12" when tested with a straightedge. The Contractor shall take the necessary precautions to prevent slumping of the edge of the concrete at contact joints.

4. Line and Grade Control:
   a. Contractor shall establish references at suitable intervals for line and grade control of the placing operations.
   h. Contractor shall furnish, place and maintain such supports, wire devices and materials that may be required to provide continuous line and grade reference controls to the placing machine, trimmers, or paver.

3.07 CURING

A. Protect placed concrete from the effects of hot or cold weather as required under Section 03300 of these specifications.

B. Membrane Curing Compound

1. Surfaces of newly placed or exposed concrete shall be kept moist or wet until the curing compound is applied. The curing compound shall be applied immediately after all patching or surface finishing has been completed.

2. The curing compound shall be delivered to the work in ready mixed form. At the time of use, the compound shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. The compound shall not be diluted or altered in any manner.

3. Curing compound that has become chilled to such an extent that it is too viscous for satisfactory application shall be warmed to a temperature not exceeding 100˚ F, unless otherwise specified by the manufacturer's recommendations.

4. The curing compound shall be applied to the exposed surface at a uniform rate of 1 gallon per 100 square feet, unless otherwise specified by the manufacturer's recommendations.

5. In the event that the application of curing compound is delayed, the application of water spray, ponding, or soaked tarps shall be started immediately and shall be continued until application of the compound is started or resumed.

3.08 PROTECTION

A. Contractor shall protect the concrete against all damage and markings.

B. Erect and maintain suitable barricades and barriers to protect the finished surface. Any sections damaged from traffic or other causes prior to final acceptance shall be removed, replaced, or repaired to the Owner's satisfaction at no additional expense to the Owner.

C. Concrete surface shall be protected against pitting or damage due to rain.

END OF SECTION

SECTION 02720

STORM SEWAGE SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Storm sewage piping

B. Sump Drains

1.02 RELATED WORK

A. Section 03100 - Concrete Formwork

B. Section 03200 - Concrete Reinforcement

C. Section 03300 - Cast-In-Place-Concrete

1.03 QUALITY ASSURANCE

A. Workmanship and methods employed in the handling, transportation, storage, bedding, and laying of pipe, fittings, associated structures and accessories shall conform to the appropriate manufacturers' recommendations and/or ASTM recommendations.

B. All products shall be inspected by Contractor, prior to installation, for damage. No damaged products will be used.

1.04 REFERENCES

A. "Manual of Standard Practices", Concrete Reinforcing Steel Institute (CRSI)

B. American Society for Testing and Materials (ASTM):

1. A-615, "Deformed and Plain Billet-Steel Bars for Concrete Reinforcement"

1.05 SUBMITTALS

A. Submit manufacturer's specifications for all products.

1.06 DELIVERY AND HANDLING

A. Load and unload pipe, fittings, and accessories in such a manner as to avoid shock or damage.

1.07 METHOD OF MEASUREMENT AND BASIS FOR PAYMENT

A. **Furnish and Install 12" ADS Pipe**. Measurement and payment will be based upon the in-place lineal footage of 12" ADS storm drain pipe installed and shall include all costs associated with removing existing native material, trenching, shoring, excavating, compacting, backfilling, etc. in accordance with the plans and

specifications. Such payment shall include the costs of all materials, labor, tools, equipment, etc. to complete this work.

B. **Furnish and Install Concrete Catch Basin and Grate Curb Opening**. Measurement and payment will be based upon each curb opening concrete catch basin and grate installed and shall include all costs associated with excavating, shoring, forming, compacting, backfilling, etc. in accordance with the plans and specifications. Such payment shall include the costs of all materials, labor, tools, equipment, etc. to complete this work.

C. **Furnish and Install Concrete Catch Basin and Grate 2' x 2' Box**. Measurement and payment will be based upon each 2' x 2' concrete catch basin and grate installed and shall include all costs associated with excavating, shoring, forming, compacting, backfilling, etc. in accordance with the plans and specifications. Such payment shall include the costs of all materials, labor, tools, equipment, etc. to complete this work.

D. **Furnish and Install Interceptor Drain**. Measurement and payment will be based upon the in-place lineal footage of Interceptor Drain installed in accordance with the plans and specifications and shall include all costs of trenching, shoring, excavating, compacting, backfilling, etc. in accordance with the plans and specifications. Such payment shall include the costs of all materials, labor, tools, equipment, etc. to complete this work.

PART 2 PRODUCTS

2.01 INLET AND CLEANOUT BOX MATERIALS

A. Concrete, forms and reinforcement: Shall be as specified in Section 03300, 03100 and 03200, respectively.

B. Rings, Lids and Grates shall be as specified on the Drawings.

PART 3 EXECUTION

3.01 PREPARATION

A. When connections are to be made to any existing pipe, conduit, or other improvement, the actual elevation or position of which cannot be determined without excavation, the Contractor shall excavate for and expose the existing improvement before laying any pipe or conduit.

3.02 PIPE INSTALLATION

A. Bedding:

1. Bedding shall be prepared in accordance with Section 02220 - TRENCHING, BACKFILLING AND COMPACTING and as shown on the Drawings.

2. Lay all pipes on a firm bed, true to the line and grade, and abutt the end and shoulder of each pipe against the other in such a manner that there is no unevenness of any kind along the bottom half of the pipe line.

B. During all phases of pipe installation, dewater trench to prevent floating of pipe.

C. Manufacturers' Recommendations: Perform all work in strict accordance with the manufacturer's recommendations for the type of pipe being installed.

D. Prevent contact between the pipe and compaction equipment. Compaction of bedding and backfill material should generally be done in such a way so that compaction equipment is not used directly above the pipe until sufficient backfill has been placed to assure that such compaction equipment will not have a damaging effect on the pipe.

3.03 INLET AND CLEANOUT BOXES

A. Formwork: Shall be as specified in Section 03100.

B. Reinforcement: Shall be as specified in Section 03200.

C. Cast-in-place Concrete: Shall be as specified in Section 03300.

3.04 CLEANING AND FLUSHING OF STORM SEWAGE PIPING

A. Thoroughly clean all pipe lengths or units laid of all debris immediately after laying.

B. Thoroughly clean by flushing and remove all debris from the pipeline and drainage structures prior to acceptance of the work by the Construction Manager.

3.05 PROTECTION

A. Protect all newly poured concrete from damage by placing barricades or enclosures in accordance with Section 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS.

END OF SECTION

SECTION 02763

PAVEMENT MARKING AND SIGNING

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To

1.Furnish material and apply pavement and curb markings as described in Contract Documents.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements - Paint handicap spaces to conform to ADA Standards and local code requirements.

1.3 PROJECT/SITE CONDITIONS

A. Environmental Requirements

1. Apply only on dry surfaces and during favorable weather, and when damage by rain, fog, or condensation not anticipated.

1.4 METHOD OF MEASUREMENT AND BASIS FOR PAYMENT

A. Furnish and Install Paint Striping and Signing. No measurement will be made and payment shall be based upon the lump sum bid item amount. Such payment shall include the costs for furnishing and installing 2 coats of paint striping and signing in accordance with all requirements listed in the plans. Such payment shall include the costs of all posts, bases, materials, labor, equipment, fees, etc to complete this work.

PART 2 PRODUCTS

2.1 MATERIAL

A. Paint

1. Non-reflectorized.

2.Types-

a. Acrylic Latex for uncured paving

] b. Alkyd or chlorinted rubber for cured paving

PART 3 EXECUTION

3.1 PREPARATION

A. Contractor may apply paint striping immediately after installation and compaction of asphalt.

B.Surfaces shall be fully vacuumed swept and dry and free of grease and loose dirt particles. Scrape and wire brush chipped or damaged paint on existing curbs.

C. Perform layout with chalk or lumber crayon only.

3.2 APPLICATION

A. Site Tolerances
1. General - Make lines parallel, evenly spaced, and with sharply defined edges.

2.Line Widths -
a. Plus or minus 1/4 inch variance on straight segments.
b. Plus or minus 1/2 inch variance on curved alignments.

B. Provide two coat application.

3.3 CLEANING

A. Remove drips, overspray, improper markings, and paint material tracked by traffic by sand blasting, wire brushing, or other method approved by Engineer prior to performance.

END OF SECTION

SECTION 03100

CONCRETE FORMWORK

PART 1 GENERAL

1.01 WORK INCLUDED

A. Concrete formwork for on-site cast-in-place concrete waterway, or other improvements removed or damaged during the work.

1.02 RELATED WORK

A. Section 02525 - Concrete Waterways

B. Section 03200 - Concrete Reinforcement

C. Section 03300 - Cast-In-Place Concrete

1.03 QUALITY ASSURANCE

A. Comply with federal, state, and/or local codes and regulations.

B. All work shall be performed by experienced and qualified workmen.

1.04 METHOD OF MEASUREMENT AND BASIS FOR PAYMENT

A. No measurement will be made.

B. Payment will be included in the lump sum contract amount.

PART 2 PRODUCTS

2.01 UTILITY STRUCTURE FORM MATERIALS

A. Forms shall be of suitable material and of a type, size, shape, quality, and strength to insure construction as designed.

B. Metal forms for exposed surfaces may be used when all bolt and rivet holes are countersunk so that a plane, smooth surface of the desired contour is obtained.

C. Rough lumber may be used for forming surfaces that will be covered by earth in the finished structure.

D. Forms for all surfaces that will not be completely enclosed or hidden below the permanent surface of the ground shall be made of surfaced lumber, or material which will provide a surface at least equal to surfaced lumber or plywood.

E. All lumber shall be free from knotholes, loose knots, cracks, splits, warps, or other defects affecting the strength or appearance of the finished structure. Any lumber or material which becomes badly checked or warped, prior to placing concrete, shall not be used.

PART 3 EXECUTION

3.01 PREPARATION

A. All forms shall be free of bulge and warp, and shall be cleaned thoroughly before being used.

3.02 FORM CONSTRUCTION

A. Forms shall be so constructed that the finished concrete shall be of the form and dimensions shown on the plans and true to line and grade, and sufficiently rigid to resist deflection. Design of formwork and removal of forms and shores are to conform to ACI 318. The responsibility for their adequacy shall rest with the contractor.

B. All forms shall be mortar tight and so designed and constructed that they may be removed without injuring the concrete.

C. If, at any stage of the work, during or after placing the concrete, the forms sag or bulge to such an extent as to allow concrete to fall below the elevation shown on the plans, or outside the true line of the form, the concrete affected shall be removed.

D. No concrete may be deposited against the earth as a side form.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 WORK INCLUDED

A. Placing of concrete reinforcing for cast-in-place concrete water, sanitary sewage and storm sewage system structures.

1.02 RELATED WORK

A. Section 03100 - Concrete Formwork

B. Section 03300 - Cast-In-Place Concrete

1.03 QUALITY ASSURANCE

A. Comply with federal, state, and/or local codes and regulations.

B. All work shall be performed by experienced and qualified workmen.

1.04 REFERENCES

A. "Manual of Standard Practices", Concrete Reinforcing Steel Institute (CRSI)

B. American Society for Testing and Materials (ASTM):
   1. A-615, "Deformed and Plain Billet-Steel Bars for Concrete Reinforcement"

1.05 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

A. No measurement will be made.

B. Payment will be included in the lump sum contract amount.

PART 2 PRODUCTS

2.01 STEEL MATERIALS

A. Reinforcing steel:
   1. All reinforcing bar material used for reinforcement of concrete shall be intermediate Grade 60 steel conforming to the requirements of ASTM A-615.
   2. All rods shall be deformed and round.
   3. All reinforcement shall be uncoated, free from rust, scale, form oil, etc.
   4. Welded wire fabric for concrete reinforcement shall conform to ASTM A-185.

B. Accessories:
   1. All accessories, including such items as chairs, spacers, saddles, etc., shall be of steel formed in such a manner and with sufficient strength to perform the intended functions. Chairs, spacers, saddles, etc., which are set in contact with forms, are to be galvanized or provided with plastic tips or coating to prevent rust spots on finish concrete surface.

C. Wire:
   1. All tying steel shall not be less than 18 gage annealed iron lacing wire. All wire tie ends shall point away from forms.

PART 3 EXECUTION

3.01 PREPARATION

A. All reinforcement shall be free from loose mill scale, loose or thick rust, dirt, paint, oil, or grease, and shall present a clean surface.

3.02 PLACING STEEL REINFORCEMENT

A. Reinforcing bars shall be accurately placed as shown on the plans and shall be firmly and securely held in position in accordance with the "Manual of Standard Practice" of the Concrete Reinforcing Steel Institute, using concrete or metal chairs, spacers, metal hangers, supporting wires and other appropriate devices of sufficient strength to resist crushing under full load. Metal chairs which extend to the surface of the concrete (except where shown on the plans) and wooden supports, shall not be used.

B. Placing bars on layers of fresh concrete as the work progresses and adjusting bars during the placing of concrete will not be permitted.

C. Tack welding of reinforcing bars in place shall not be allowed.

D. Splicing:
   1. Splices of bars shall be made only where shown on the Drawings or as approved by the Owner.
   2. Where bars are spliced, they shall be lapped at least 30 diameters, unless otherwise shown on the plans.
   3. Splicing shall be accomplished by placing the bars in contact with each other and wiring them together.

E. Bending reinforcement:
   1. Bends and hooks in bars shall be made in the manner prescribed in the "Manual of Standard Practice" of the Concrete Reinforcing Steel Institute.
   2. Bars shall not be bent or straightened in a manner which will injure the material.
   3. Bars with kinks or unspecified bends shall not be used.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 WORK INCLUDED

A. Inspection

B. Preparation

C. Placing Concrete

D. Hot Weather Concreting

E. Cold Weather Concreting

F. Expansion, Contraction and Construction Joints

G. Finishing

H. Curing

I. Field Quality Control

J. Protection

1.02 RELATED WORK

A. Section 03100 - Concrete Formwork

B. Section 03200 - Concrete Reinforcement

1.03 QUALITY ASSURANCE

A. Qualifications of Workmen:
   1. Use workmen thoroughly trained and experienced in placing and finishing the types of concrete specified.

B. Comply with federal, state and local codes and regulations.

C. Comply with hot or cold weather requirements as applicable.

1.04 REFERENCES

A. The American Concrete Institute (ACI):
   1. 306R, "Cold Weather Concreting"

   2. 305R, "Hot Weather Concreting"

3. 318-83, "Building Code Requirements"

B. American Society for Testing and Materials (ASTM):
1. C-150, "Portland Cement"
2. C-33, "Concrete Aggregates"
3. C-94, "Ready-Mixed Concrete"

1.05 SUBMITTALS

A. A mix design and information based on trial batch test results shall be submitted to Owner at least two weeks prior to commencement of the work.

B. Results from a reputable independent testing laboratory showing concrete aggregates comply with applicable sections of ASTM C-33. Contractor shall pay for necessary tests as directed by Engineer. A minimum of one test shall be made on the aggregate used for the first 5 cubic yards of concrete and for each 50 cubic yards thereafter. Should the Engineer deem that additional testing of aggregate is necessary, he may select samples from any of the aggregate to be used and have these samples tested by a recognized laboratory of his choice. Such material shall not be used in the work until the test reports are available. Should the material fail to meet the specified requirements, the aggregate will be rejected and the expense of testing shall be borne by the Contractor. Should the tests show the aggregate to be satisfactory, the cost of additional testing will be borne by the Owner.

D. Submit manufacturer's information (catalog data) for all products.

1.06 DELIVERY, STORAGE AND HANDLING

A. Ready-mixed concrete: Concrete shall be mixed only in such quantities as are required for immediate use. The maximum allowable time between charging of the material in the mixing drum and final placing shall be ninety minutes for air temperatures below 80` F and sixty minutes for temperatures above 80` F. Concrete not placed within these time limits, or if an initial set has developed shall not be used. Tempering concrete by adding water or by other means will not be permitted.

B. Materials shall be delivered, stored, and handled so as to prevent damage by water or inclusion of foreign materials. Packaged materials shall be delivered and stored in original package, marked with brand and maker's name, until ready for use. Packages of materials showing evidence of water or other damage shall be rejected. Bulk cement shall be identified by shipping and delivery statements.

C. Cement shall not be stored longer than 4 months before usage.

1.07 WARRANTY

A. Shall be for two (2) years in accordance with applicable laws and regulation. See General Conditions.

1.08 METHOD OF MEASUREMENT AND BASIS FOR PAYMENT

A. No measurement will be made.

B. Payment will be included in the lump sum contract amount.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

A. Cement:
1. Portland cement shall be Type II, low alkali, complying with ASTM C-150, unless otherwise specified.
2. Air-entrainment of cement is required.

B. Coarse Aggregates:
1. Coarse aggregate shall consist of gravel, crushed gravel, crushed stone, air-cooled blast furnace slag, or crushed hydraulic-cement concrete, or a combination thereof, conforming to the requirements of ASTM C-33.
2. The amount of deleterious substances included in the aggregate shall not exceed the amount specified in ASTM C33.
3. Coarse aggregate size shall be graded within the following limits.

Coarse Aggregate Size (Nominal)	Percent Passing (by weight)					
	1-1/2"	1"	3/4"	1/2"	3/8"	No. 4
3/4"	100	95-100	-	25-60	-	0-10

C. Fine aggregate:
1. Fine aggregate shall consist of natural sand, manufactured sand, or a combination thereof, conforming to the requirements of ASTM C-33.
2. Shall not be used in the work until approval by the Engineer of the tests performed by the independent testing laboratory.
3. The amount of deleterious substances included in the aggregate shall not exceed the amount specified in ASTM C33.
4. Fine aggregate shall be uniformly graded from coarse to fine within the following gradation:

Sieve Size	Percent Passing (by weight)
3/8"	100
No. 4	95-100
No. 16	45-80
No. 50	10-30
No. 100	2-10

D. Water:

1. Water used in washing aggregate and mixing concrete shall be of a potable quality clean and free from oil, acid, salt, injurious amounts of alkali, organic matter or other deleterious substances.

E. Admixtures:
1. The air-entraining admixture shall conform to ASTM Designation C-260 and be added at the mixer, not the job site.
2. Flyash shall NOT be used in concrete.
3. Use Pro Mesh Fiber Mesh additive in concrete or approved equal. Follow manufacturer's recommendations. Add approximately 1.5 pounds of additive per cubic yard of mix. Mix well and wait for a minimum of 5 minutes before placing.
4. No other admixtures will be allowed unless approved by the Engineer.

F. Concrete curing compound:
1. Liquid membrane curing compound shall conform to all applicable sections of ASTM C-309.

2.02 CONCRETE MIX

A. Concrete shall consist of a mixture of Portland Cement, water, fine and coarse aggregates, and an air entraining agent.

B. The proportions of the concrete materials shall produce a mixture that will work readily into corners and angles of forms and around reinforcing steel. The mixture shall have a water content which does not exceed the maximum specified amount, and which shall have the required compressive strength.

C. The methods of measuring concrete materials shall permit proportions to be accurately controlled and easily checked. Measurement of materials for ready-mixed concrete shall conform to ASTM C-94. Engineer shall have free access to the mixing plant at all times.

D. Concrete mix shall be as follows (unless otherwise shown or specified). The proportions given below are intended to give the required strength and shall be carefully followed as to minimum quantity of cement per cubic yard of concrete and as to water/cement ratios and more cement per cubic yare of concrete will be required if tests indicate necessity for such increased quantity to achieve the design strength:

Intended Use	Coarse Aggregate Size (-inches)	Min. Cement Content (sacks/CY)	Min. 28-Day Compressive Strength (psi)	Min. 14-Day Flexural Strength (psi)	Slump (inches)	Air Entrainment (percent)	Max. Water/Cement Ratio
Concrete Pavement, Storm Drain Inlet Boxes, Curbs & Walks	3/4	6.5	4000	550	2.5-4.0	6.5 +/- 1%	0.45

2.04 EQUIPMENT

A. Mixing equipment shall be subject to approval. Mixers may be of the stationary plant, paver, or truck mixer type.

B. Each mixer shall be equipped with a device for accurately measuring and indicating the quantity of water entering the concrete, and the operating mechanism shall be such that leakage will not occur when the valves are closed.

C. Adequate equipment and facilities shall be provided for accurate measurement and control of all materials, and for readily changing the proportions of the material. The batch plant shall be capable of controlling the delivery of all material to within 1% by weight of the individual material. If bulk cement is used, it shall be weighed on a separate visible scale which will accurately register the scale load at any stage of the weighing operation from zero to full capacity.

D. Mixers shall be equipped with a device for automatically measuring and indicating the time required for mixing, which device shall be interlocked to prevent the discharge of concrete from the mixer before the expiration of the mixing period. Neither speed nor volume capacity of the mixers shall exceed manufacturer's recommendations. Excessive over-mixing, requiring additions of water to preserve the required consistency, will not be permitted.

PART 3 EXECUTION

3.01 INSPECTION

A. Inspect subgrade surface and verify grade and adequacy of compaction.

B. Correct grade and compaction deficiencies.

C. Notify the Engineer in writing of readiness to place concrete in any portion of the work, This notification shall be given as far in advance of the placing of concrete as the Engineer deems necessary for him to make final inspection of the preparations at the location of the proposed concrete placing. All forms, steel, screeds, anchors, ties, and inserts shall be in place before the Contractor's notification of readiness is given to the Engineer.

D. No concrete shall be placed until forms, reinforcement, etc. has been inspected by the Engineer.

3.02 PREPARATION

A. Remove all water, wood scraps, ice, snow, frost and debris from the areas in which concrete will be placed.

B. Thoroughly clean the areas to ensure proper placement and bonding of concrete.

C. Thoroughly dampen the surfaces which will come into contact with the concrete (except in freezing weather), forms may be oiled instead; remove all standing water. Reinforcement shall be thoroughly cleaned of all ice and other coatings.

D. Thoroughly clean all transporting and handling equipment.

E. Erect and maintain suitable barriers to protect the finished surface. Any section damaged from traffic or other causes occurring prior to its official acceptance, shall be repaired or replaced by the Contractor at his own expenxe in a manner satisfactory to the Owner.

F. The concrete surface must not be damaged or pitted by rain, hail or snow.

G. Concrete shall not be placed until all reinforcement is securely and properly fastened in its correct position, and until the form ties at construction joints have been retightened, all sleeves, hangers, pipe, bolts and any other items required to be embedded in the concrete have been placed and anchored and the forms cleaned and coated as specified.

3.03 PLACING CONCRETE

A. Except by specific written authorization, concreting operations shall not be continued when a descending air temperature, in the shade and away from artificial heat, falls below 40 F, nor shall operations be resumed until ascending air temperature, in the shade and away from artificial heat, reaches 35 F.

B. Convey concrete from mixer to place of final deposit by methods that will prevent separation and loss of materials.
   1. The free fall of concrete from the end of the spout or chute, or from a transporting vehicle, shall not exceed 6 feet, except when beginning a wall pour, in which case the free fall shall not exceed 2 feet.
   2. When the distance through which concrete must be dropped vertically exceeds the maximums specified above, a tremie or flexible metal spout shall be used. Flexible metal spouts having sufficient strength to hold the weight of the concrete shall be composed of conical sections not nore than 3 feet long, with the diameter of the outlet and taper of the various sections such that the concrete will fill the outlet and be retarded in its flow.
   3. Chutes, troughs, or pipes used as aids in placing concrete shall be arranged and used so that the ingredients of the concrete will not be separated. Chutes and troughs shall be of metal or metal-lined. When steep slopes are necessary, the chutes shall be equipped with baffle boards or a reversed section at the outlet. Open troughs and chutes shall extend, if necessary, down inside the forms or through holes left in the forms; or the ends of such chutes shall terminate in vertical downspouts,
   4. Pumping: The equipment shall be so arranged that no vibrations result which might damage freshly placed concrete. Where concrete is conveyed and placed by mechanically applied pressure, the equipment shall be suitable in kind and adequate in capacity for the work. The operation of the pump shall be such that a continuous stream of

concrete without air pockets is produced. When pumping is completed, the concrete remaining in the pipe line, if it is to be used, shall be ejected in such a manner that there will be no contamination of the concrete or separation of the ingredients. Before and after this operation, the entire equipment shall be thoroughly cleaned. Water shall not be added to the concrete in the pump hopper.

C. Place concrete as dry as possible consistent with good workmanship, never exceeding the maximum specified slump.

D. Place concrete at such a rate that concrete is at all times plastic and flows readily between bare bars. No segregation of coarse aggregate shall occur when placing or dropping between bars.

E. When placing is once started, carry it on as a continuous operation until placement of the section is complete.

F. Do not pour a greater area at one time than can be properly finished without checking; this is particularly important during hot or dry weather.

G. Do not use retempered concrete that has been contaminated by foreign materials.

H. Struts, stays, and braces serving temporarily to hold the forms in correct shape and alignment, pending the placing of concrete at their locations, shall be removed when the concrete placing has reached the elevation and strength rendering their service unnecessary. These temporary members shall be entirely removed from the forms.

I. Build into concrete any nosings, inserts, anchors, structural members, ties and hangers required to secure abutting or adjacent materials. Waterstops shall be prevented from bending over or being moved out of position.

J. Unless necessary materials and equipment are readily available to adequately protect the concrete in place, placing operations may be postponed by the Engineer when, in the opinion of the Engineer, impending conditions may result in rainfall or low temperatures which will impair the quality of the finished work. The Contractor shall pay for all delay related costs resulting from such postponements including costs for removing and replacing damaged concrete. In case rainfall should occur after placing operations are started, provide ample covering to protect the work.

K. Whenever it is necessary to continue the mixing, placing, and finishing of concrete after daylight hours, the site of the work shall be adequately lighted so that all operations are plainly visible. Every effort shall be made to enable finishing to be done in daylight.

L. Clean up all spilled concrete and washings thoroughly. Concrete trucks shall not be washed-out on job site. Wash trucks at off-site location in accordance with all applicable laws and ordinances.

3.04 HOT WEATHER CONCRETING

A. Hot weather is defined as any combination of high air temperature, low relative humidity, and wind velocity tending to impair the quality of fresh or hardened concrete or otherwise resulting in

abnormal properties. Hot weather concreting shall follow the guidelines of ACI 305R, latest edition.

B. Undesirable hot weather effects on concrete in the plastic state may include:
1. Increased water demand.
2. Increased rate of slump loss and corresponding tendency to add water at job site.
3. Increased rate of setting resulting in greater difficulty with handling, finishing, and curing, and increasing the possibility of cold joints.
4. Increased tendency for plastic cracking.
5. Increased difficulty in controlling entrained air content.

C. Undesirable hot weather effects on concrete in the hardened state may include:
1. Decreased strength resulting from higher water demand and increased temperature level.
2. Increased tendency for drying shrinkage and differential thermal cracking.
3. Decreased durability.
4. Decreased uniformity of surface appearance.

D. Placing and curing:
1. Concrete shall be handled and transported with a minimum of segregation and slump loss. Concrete temperature at time of placement shall be such that the rate of evaporation for the weather conditions shall not cause cracking.
2. The aggregate shall be cooled by frequent spraying in such a manner as to utilize the cooling effect of evaporation. The placement schedule shall be arranged, as approved, in such a manner as to provide time for the temperature of the previously placed course to begin to recede. The mixing water shall be the coolest available at the site insofar as is practicable.
3. Concrete shall be placed where it is to remain.
4. Concrete shall be placed in layers shallow enough to assure vibration well into the layer below.
5. Surfaces exposed to the drying wind shall be covered up immediately after finishing with polyethylene sheets and be water cured continuously as soon as the concrete has set up. Curing compounds, in lieu of water, may not be used.
6. Joints shall be made on sound, clean concrete.
7. Finishing operations and their timing shall be guided only by the readiness of the concrete for them, and nothing else.
8. Curing shall be conducted in such a manner that at no time during the prescribed period will the concrete lack ample moisture and temperature control. Facilities must be ready to protect promptly all exposed

surfaces from drying. All work determined by Engineer to be damaged from hot weather shall be removed and replaced at no cost to Owner.

9. All materials and workmanship required to meet the hot weather requirements shall be supplied at the Contractor's own expense.

3.05 COLD WEATHER CONCRETING

A. Cold weather is generally defined as a period when for more than 3 successive days the mean daily temperature drops below 40 F. When temperatures above 50 F occur during more than half of any 24-hour period, the weather should no longer be regarded as "cold". The times and temperatures given for various conditions and situations are not exact values and should not be used as such. Weather conditions are variable and common sense must be used to protect the concrete. Cold weather concreting shall follow the guidelines of ACI 306R, latest edition.

B. All materials and workmanship required to meet the cold weather requirements shall be supplied at the Contractor's own expense.

1. Preparation:
   a. When specific written authorization is given to permit concreting operations at temperatures below those specified in 3.03 PLACING CONCRETE, arrangements for covering, insulating, housing, or heating materials and/or newly placed concrete should be made in advance of placement and should be adequate to achieve the temperature and moisture conditions recommended herein in all parts of the concrete. All equipment and materials necessary should be at the work site before the first frosts are likely to occur, not after concrete has been placed and its temperature begins to approach the freezing point.
2. Placement and protection:
   a. During placement of concrete, tarpaulins, or other readily movable coverings supported on horses or framework should follow closely the placing of the concrete so that only a few feet of concrete are exposed to outside air at any time.
   b. The housing, covering, or other protection used in curing shall remain intact at least 24 hours after artificial heating is discontinued.
   c. All concrete placed in forms shall have a temperature between 55` and 90` after placement. Adequate means shall be provided for maintaining the surrounding air at 60 F for at least seventy-two hours after placing and at no less than 40 F for an additional four days. All methods and equipment for heating shall be subject to approval. Insulating blankets shall be used when required to maintain a satisfactory temperature during the curing period.
   d. No dependence shall be placed on salt or other chemicals for the prevention of freezing.
   e. If heating or other protective measures need to be taken to prevent concrete from freezing, the concrete may require special curing methods to prevent rapid drying, as described in ACI 306R-78.

3.06 EXPANSION, CONTRACTION AND CONSTRUCTION JOINTS

A. Shall be formed and sealed as shown on the drawings or as required in individual Specifications Sections.

3.07 FINISHING

A. Surface preparation: Immediately after the removal of forms, all fins and irregular projections shall be removed from surfaces, whether or not they are to be covered with high tensile wire and shotcrete covercoats.

B. The finishing shall commence immediately after the concrete is placed. Any delay in excess of thirty minutes in performing the preliminary finishing shall constitute cause for shutting down the placing operation.

C. The finished surface shall be true to grade and cross section, free from ruts, humps, depression or other irregularities.

D. Finish Types: Finish shall be as shown on the Drawings or as specified in individual specification sections in accordance with the following:
   1. Patched: Remove all fins and irregular projections. Clean form-tie holes thoroughly, coat with suitable epoxy and fill with mortar of dry consistency (see PART 2 - PRODUCTS).
   2. Rubbed: Use proper grout mix (see PART 2 - PRODUCTS) and point up voids with cement mortar. Thereafter, rub the entire surface with said grout mix and a carborundum stone to produce a relatively smooth, plane surface without defects and imperfections. Surface shall be properly cured. Use of plaster shall not be permitted. Upon completion of the rubbing, the surface shall be washed thoroughly with clean water.
   3. Float: This type of finish shall be an integral finish by float after screeding, to compact the surface evenly. Any excess surface water shall be removed before floating and no mortar shall be used for leveling.
   4. Steel Trowel: After striking off the wearing course to the established grade, it shall be compacted by rolling or tamping, and then floated with a wood or magnesium float or power floating machine. The surface shall be tested with a straightedge to detect high and low spots, which shall be eliminated. Floating shall be followed by steel troweling after the concrete has hardened sufficiently to prevent excess fine material from working to the surface. The finish shall be brought to a smooth surface, free from defects and blemishes. No dry cement nor mixture of dry cement and sand shall be sprinkled directly on the surface of the wearing course to absorb moisture or to stiffen the mix. After the concrete has further hardened, additional troweling may be required. This shall be done as may be directed by the Engineer. Trowling shall produce a dense, smooth, impervious surface, free from defects and blemishes.
   5. Sandblasting: Sandblasting shall be done using a sharp silica sand. Exterior surfaces of concrete walls shall be sandblasted with #16 silica sand, preferably by the dry sandblasting process before wire wrapping may be started. The concrete surface shall be heavily pitted, leaving no

traces of laitance, form-oil and original surface smoothness and surface color. The minimum sand consumption per 100 square feet of surface shall be 150 pounds of silica sand. Sandblasting shall not be started before the completion date of the curing period or before all tieholes have been dry-packed.

6. Formed: Immediately after the removal of forms, all fins and irregular projections shall be removed from surfaces, whether or not they are to be covered with high tensile wire and shotcrete covercoats.

E. Final finishing:
   1. When the concrete has hardened sufficiently, the surface shall be given a broom finish. The broom shall be of an approved type.
   2. The strokes shall be in a transverse direction with adjacent strokes slightly overlapped and shall be made by drawing the broom without tearing the concrete, but so as to produce regular corrugations not over 1/8 inch in depth.
   3. The surface, as thus finished, shall be free from porous spots, irregularities, depressions, and small pockets or rough spots such as may be caused by accidental disturbing during the final brooming of particles of course aggregate embedded near the surface.

3.09 CURING

A. Protect the concrete from the effects of weather in accordance with HOT WEATHER CONCRETING AND COLD WEATHER CONCRETING in this section.

B. Water for curing shall be as specified in PART 2 - PRODUCTS.

C. Other curing requirements may be required in individual Specifications Sections.

D. Membrane curing compound method:
   1. Surface of newly placed or exposed concrete shall be kept moist or wet until the curing compound is applied. The curing compound shall be applied immediately after all patching or surface finishing has been completed.
   2. The curing compound shall be delivered to the work in ready-mixed form. At the time of use, the compound shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. The compound shall not be diluted or altered in any manner.

   3. Curing compound that has become chilled to such an extent that it is too viscous for satisfactory application shall be warmed to a temperature not exceeding 100` F, unless otherwise specified by manufacturer's recommendations.
   4. The curing compound shall be applied to the exposed surface at a uniform rate of 1 gallon per 150 square feet of area, unless otherwise required by manufacturer's recommendations.
   5. In the event that the application of curing compound is delayed, the application of water as provided in this section shall be started

immediately and shall be continued until application of the compound is resumed or started.

3.10 FIELD QUALITY CONTROL

A. Testing will be provided by a testing laboratory employed by the Owner. The Engineer shall select the testing agency from Owner's list of approved labs. Refer to individual Specifications Sections for other Field Quality Control requirements.

B. All testing will be paid for by Owner, except for retesting of material which fails to meet these specifications. Such retesting shall be paid for by Contractor at no expense to Owner. Contractor shall pay for curing cylinders. Testing agency shall transport cylinders.

C. Concrete sampled from a concrete pump shall be sampled from the hose after all of the priming grout has been wasted. The end of the hose shall be placed in a horizontal position before the concrete is discharged into the sampling pan. The concrete shall not be allowed to fall into the sampling pan.

D. The Contractor, at his expense, shall furnish the concrete required for testing.

E. Strength, slump and air tests shall be taken in accordance with the following unless otherwise specified in individual Specifications Sections:

1. Strength, slump and air tests may be taken in accordance with the placement rate per day as shown below:

Rate/Day (C.Y.)	Air	Slump	Compress. Strength	Flexural Strength
0-8	1	1	Optional	Optional
8-50	1	1	1	1
For each 50 C.Y. or fraction there-of	1	1	1	1

Additional tests may be made at the discretion of the Owner.

2. Compressive strength test specimens shall be made and cured in accordance with ASTM C-31; Specimens shall be tested in accordance with ASTM C-39.
   a. Three specimens shall be made by the Engineer for each test, and these shall be broken at 7 and at 28 days, with one held in reserve.
   b. At least one test (3 specimens) shall be made for <u>each class</u> of concrete poured during one day.

3. Flexural strength test specimens shall be prepared in accordance with AASHTO Designation T-23 and tested for flexural strength in accordance with AASHTO Designation T-97.

a. Four specimens shall be made by the Engineer for each test, and one shall be broken at 7 and two at 14 days, with one held in reserve.
b. At least one test (4 specimens) shall be made for each class of concrete placed during one day.

4. If a slump test does not meet the specification, a second slump test shall be made immediately on the same load. The concrete shall be accepted if the second slump test meets the specification or rejected and removed from the project if the second slump test does not meet the specification.
5. If an air test does not meet the specification, a second air test shall be made immediately upon the same load. The concrete shall be accepted if the second air test meets the specification or rejected and removed from the project if the second air test does not meet the specification.
6. Slump and air tests shall be made in accordance with ASTM C-143 and C-231, respectively.
7. The maximum allowable time between charging of the material in the mixing drum and final placing shall be ninety minutes for air temperatures below 80 F and sixty minutes for temperatures above 80 F. Concrete not placed within these time limits, or if an initial set has developed shall not be used. Tempering concrete by adding water or by other means will not be permitted.
8. If a compressive strength test is below the required specified strength, the Engineer shall immediately notify the Contractor or his authorized representative.
9. All costs incurred in resampling and retesting shall be paid by the Contractor if the retested strength is below the specified strength, and shall be assumed by the Owner if the retested strength is above the specified strength.

3.11 PROTECTION

A. Comply with applicable parts of Section 03300 for protection of concrete. Also comply with HOT WEATHER CONCRETING and COLD WEATHER CONCRETING requirements specified herein.

B. Provide barricades and enclosures to prevent damage to newly placed concrete.

C. Replace concrete curb, walls and exterior flatwork damaged by construction activities as directed, at no cost to Owner.

D. Every reasonable precaution shall be taken to protect finished surfaces from abrasions or other damage. Concrete surfaces or edges likely to be injured during the construction period shall be protected by leaving the forms in place or by erecting satisfactory covers. No fire shall be permitted in direct contact with concrete at any time. Concrete shall be adequately protected from injurious drying action by sun and wind, and from pitting by rain.

END OF SECTION

SECTION 02810

IRRIGATION SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all irrigation equipment and accessories complete, in place, as shown on the drawings, specified herein, and needed for a complete and proper installation.

B. It will be the contractor's responsibility to report to the Engineer any deviations between the drawings, specifications and the site. Failure to do so prior to the installing of equipment, and resulting in replacing, and/or relocating, will be done at the contractor's expense.

1.2 AS-BUILT IRRIGATION DRAWINGS

A. Prepare as-built drawings which show deviations from the contract documents made during construction affecting the main line pipe, controller locations, remote control valves, manual drain valves, and all drip distribution and collection line locations. The drawings shall also indicate and show approved substitutions of size, materials and manufacturer's name and catalog number. The Contractor will keep a record of all departures from the contract drawings that occur during construction. These shall be kept on a clean set of prints of the contract drawings. The Engineer will review the "as-built" to verify that changes are being recorded as construction occurs.

1.3 PERMITS AND FEES

A. Obtain all permits and pay required fees to any governmental agency having jurisdiction over the work. Inspections required by local ordinances during the course of construction shall be arranged as required. On completion of the work, satisfactory evidence shall be furnished to the Owner's representative to show that all work has been installed in accordance with the ordinances and code requirements. See existing utilities paragraph below.

1.4 QUALITY ASSURANCE

A. This contract work is to be conducted primarily by and coordinated by a licensed Landscape Irrigation Contractor specializing in landscape irrigation work. All work that is irrigation related work shall be conducted by employees who have each had a minimum of one year of experience constructing landscape irrigation systems. The on site supervisor must have a minimum of three years experience constructing landscape irrigation systems and one year experience in a supervisory role.

1.5 COORDINATION

A. Coordinate and cooperate with other contractors to enable the work to proceed as

rapidly and efficiently as possible.

1.6 INSPECTION OF SITE

A. The contractor shall acquaint him/herself with all site conditions. Should utilities not shown on the plans be found during excavations notify the Engineer. Failure to do so will make the contractor liable for any and all damage thereto arising from his/her operations subsequent to discovery of such utilities not shown on plans.

1.7 EXISTING UTILITIES

A. Before any trenching, excavation or digging below the surface for any reason is begun, the contractor shall have the area "Blue Staked" in order to determine as close as possible the location of all underground utilities. The contractor will conduct his/her work in such a manner to protect all utilities from damage. It is the responsibility of the contractor to repair or replace any damage incurred by the contractor or the contractor's employees at no expense to the owner.

1.8 PROTECTION OF EXISTING SITE CONDITIONS

A. The contractor shall take necessary precautions to protect site conditions to remain. Should damage be incurred, the contractor shall repair the damage to its original condition at the contractor's own expense. Contractor shall be responsible for the continued watering of all areas affected by construction. This can be completed by handwatering, the use of tempoary irrigation systems or the continued opperation of existing systems not disturbed by construction.

1.9 GUARANTEE

A. All work shall be guaranteed for compliance with the drawings and specifications for a period of one year after the date of substantial completion. The contractor shall make good any deficiencies at the time he/she is notified of any faults, and place in satisfactory condition any damage to the buildings or grounds without cost to the owner. All guarantees shall be in writing and approved by the Engineer before submitting to the Owner.

1.10 SUBMITTALS

A. Submit three copies of manufacturer's technical data and installation instructions for landscape irrigation system.

PART 2 - MATERIALS

2.1 GENERAL

A. All materials throughout the system shall be new and in perfect condition. After award of the contract and prior to beginning work, the Contractor shall submit for approval three copies of the complete list of materials which he/she proposes to install. Quantities of materials and

equipment need not be included. No deviations from the specifications shall be allowed, except as provided for in these documents.

2.2 PIPING

A. All main line pipe shall be Schedule 40, Type 1120-1220 Polyvinyl Chloride (PVC) pipe and shall conform to CS-256-63. All lateral lines shall be Schedule 40, Type 1120-1220 Polyvinyl Chloride (PVC). All piping shall be free from cracks, holes, foreign material, blisters, inside bubbles, wrinkles and dents. Pipe ratings shall be printed on the pipe and no pipe shall be less than 3/4" diameter.

B. Pipe Joints: All joints shall be solvent welded as per manufacturer's recommendations, using both the proper primer and glue. All joints must be allowed to set for a minimum of 24 hours prior to pressure testing.

2.3 FITTINGS

A. Fittings for main and lateral lines shall be Schedule 40, Polyvinyl Chloride (PVC). Do NOT use galvanized fittings of any kind.

B. Fittings on flex swing risers shall be barbed insert ells made of THICK-WALLED POLY PIPE as manufactured by Rainbird.

2.4 RISERS

A. Flexible swing pipe shall be THICK-WALLED POLY PIPE (funny pipe)as manufactured by Rainbird. This pipe is to be used only between heads and lateral lines and shall not exceed a distance of 3 feet.

2.5 SOLVENT CEMENT

A. Compatible with PVC pipe and of proper consistency.

2.6 AUTOMATIC CONTROLLERS

A. The Contractor shall furnish and install a new ESP 24 Site-sat Rainbird 24 station irrigation controller (or approved equal) and connect all new and existing valves to the new controller to the satisfaction of the College. The Contractor shall salvage the existing controller and return to the College.

2.7 VALVES

A. Ball Valves: Ball valves shall be solid bronze meeting Federal Specification WW-V-54, CLASS A, TYPE 1. Size shall be the same size as the electric valve it is installed next to. Valve shall be installed on the up-stream side of the electric remote control valve and in the same valve box.

B. Manual Drain Valves: All drain valves shall be 3/4" Mueller Oriseal and installed as per details on the drawings. This valve is to be installed on mainlines only.

1. Drains: Drains shall be installed at all low points on the mainline only. Each drain shall be provided with a gravel sump of 18" x 18" x 18" filled with 1" diameter gravel. Install the mainline such that a minimum number of drains are required. Refer to the detail on the drawings for valve stem extensions where required and valve markers.

C. Automatic Drain Valves: Automatic drains shall be 1/2" King Drains installed as per details on the drawings. Automatic drains are to be installed at low points of lateral lines only.

D. Electric Remote Control Valve: All electric remote control valves shall be of the size and type as specified on the drawings,

1. Rainbird PEB or PESB Series, Automatic Remote Control Valves, or approved equal.

2.8 SLEEVES

A. All sleeves shall be PVC Schedule 40 sized 2 pipe sizes larger then the pipe or pipes being sleeved (6" diameter min.). Install sleeves in locations as shown on the drawings and at the depths specified for lateral and mainlines. Coordinate the installation of the sleeves with installation of all hard surfaces. Mark location of all sleeves with a 3/4" galvanized roofing nail at both sides of sidewalk or curb and gutter or asphalt in such a manner that future location will not require more than hand shovel excavation. Insure that adequate amounts of sleeving are installed for both water lines and electric control wires.

2.9 ELECTRIC CONTROL WIRE

A. Wires shall be UF DIRECT BURIAL type. No wire shall be smaller than #14. Ground or neutral wires shall be WHITE, grass areas shall be RED and shrubbery areas shall be BLUE. Spare wires shall be Green.

B. No splices in electric control wires. All wires shall be 'homeruns' from the valve to the controller.

C. Conduit: Standard Electical Conduit. Size as needed.

D. Rainbird maxicom communication wire

2.10 HEADS

A. All heads shall be as specified on the drawings. Nozzle patterns are indicated and shown, however, specific site conditions may require that different nozzle patterns be used. Contractor shall adjust patterns to provide adequate coverage.

1. Rainbird 1804 PRS spray heads.

2. TORO 300 Stream rotors w/STD NO02, 01, 02 or 03.

B. All heads shown on the drawings shall be installed. Contractor shall consult with the Engineer prior to the deletion or addition of any heads.

2.11 VALVE BOXES

A. Valve boxes shall be of sufficient size to house 1 (one) electric remote control valve and still allow room for maintenance without having to excavate or perform similar operations. Boxes shall be as manufactured by Carson or Brooks Industries meeting ASTM D368 for tensile strength of 12" deep and furnish with a non-hinged cover. Each valve box is to have a 6" bottom extension minimum. The extension should allow for the installation of the valve cluster at the depth of the lateral line (12"). The contractor shall also allow for 4-6" of clear space between the valve cluster and the gravel below the valve.

B. Valve boxes shall be set flush with the finished grade. Valves shall be set 12" below the top of the box including ball valves and quick couplers where called for. Do NOT install more than one (1) electric remote control valves in a single standard valve box. All valves must have ample room and access for repair.

2.12 QUICK COUPLERS

A. All quick couplers shall be a Rainbird 44D quick coupler or approved equal.

PART 3 - EXECUTION

3.1 WORKMANSHIP

A. Lay Out work as accurately as possible to the drawings. The drawings, though carefully drawn, are generally diagrammatic to the extent that swing joints, offsets and all fittings are not shown. All irrigation lines shall be installed in common trenches where possible. Where possible, all trenching shall occur on soft spaces.

B. If for any reason full and complete coverage of all irrigation areas does not cover, irrigation contractor shall be responsible to contact the Engineer before continuing with his work.

C. All existing systems with laterial lines and heads running along existing curbs that are to be removed shall be replaced with new piping and heads. Existing heads are to be turned ouer to the College.

D. Any Major Revisions to the irrigation system must be submitted and answered in written form, along with any change in contract price.

3.2 EXCAVATION AND TRENCHING

A. Perform all excavations as required for the installation of the work included under this section, including shoring of earth banks to prevent cave-ins. Restore all surfaces, existing

underground installations, etc., damaged or cut as a result of the excavations to their original condition.

B. Trenches for lateral lines shall be dug a minimum of 12" deep and as wide as necessary to properly install pipes.

C. Trenches for mainlines shall be dug a minimum of 18" deep. Run all electrical wires in mainline trench as shown in detail on drawings. Where it becomes necessary for wires to leave the mainline trench, the trench for all electrical wires shall be treated as a mainline trench, as herein described.

D. Trenches shall be made wide enough to allow a minimum of 6 inches between parallel pipe lines.

E. All trenches are to be 12" away from all curbs, buildings and sidewalks.

3.3 PIPE LINE ASSEMBLY

A. Install automatic control valves where shown and group together where practical. Place no closer than 12 inches to walk edges, building, and walls. Install in valve box, arranged for easy adjustment and removal. Allow sufficient space around entire valve assembly. Each valve group (up to 4 valves) shall be connected to the main line through a ball valve.

B. Adjust automatic control valves to provide flow rate of rated operating pressure required for each sprinkler circuit. See schedule.

C. Plastic pipe and fittings shall be solvent welded using solvents and methods as recommended by manufacturer of the pipe, except where screwed connections are required. Pipe and fittings shall be thoroughly cleaned of dirt, dust and moisture before applying solvent with a non-synthetic bristle brush.

D. Install pipe in dry weather when temperature is above 40 degrees F. in strict accordance with Manufacturers instructions.

E. Pipe may be assembled and welded on the surface. Snake pipe from side to side of trench bottom to allow for expansion and contraction.

3.4 BACKFILLING OF TRENCHES

A. Backfill around and over the pipes in accordance with the details on the drawings. All material that is to come in contact with the pipes shall be less than 1/4 inch in diameter. This material shall be imported for this specific use if necessary. Upon the approval of the Engineer, the existing material on site may be used as backfill material above the pipes.

3.5 FLUSHING AND TESTING

A. After installation of all new pipes, including laterals for a given circuit, the control valve shall be opened fully and a full head of water be used to flush out the system

B. Testing will be performed after completion of each circuit and after completion of the entire system. At this time any necessary repair work will be done at the contractor's expense and the entire system will be in good working order prior to the issuance of the Certificate of Substantial Completion.

3.6 PIPING INSPECTIONS

A. Before any pipes are covered, the Engineer shall inspect the system for compliance with specifications and drawings. Any required changes will be made at this time at the expense of the contractor.

3.7 SYSTEM OPERATION

A. The entire system will be tested in the presence of the Engineer, in order to insure COMPLETE coverage of all areas to be watered and the automatic operation of the system using the automatic clock. Any changes required will be made at this time at the contractor's expense.

B. All heads will be adjusted to their proper coverage and set to the proper depth at this time.

3.8 AUTOMATIC CLOCK

A. All new valves shall be connected to the new clock to the satisfaction of the College.

3.9 ELECTRICAL CONTROL WIRES

A. Electrical control wires shall be installed in the same trench as the main line wherever possible. Wires shall be laid alongside the pipe by "snaking" into the trench to allow as much slack as possible for contraction and expansion of the wire. All wire connections at remote control valves will be left with two feet of wire so that the splice or the valve manifold can be brought to the surface for repairs without disconnecting the wires.

B. It is important that the joint be absolutely waterproof so that there is no chance for leakage of water and corrosion build-up on the connection. All wiring shall be 'home-run from the valve to the controller.

C. Conduit: Standard Electrical Conduit from mainline outside building to irrigation controller inside building. Size as needed for 26 wires.

3.10 SLEEVING

A. All lines to be laid under hard surfaces shall be installed in a 6" minimum PVC Schedule

40 sleeve unless noted otherwise. Depth of sleeves to be determined by the type of line that is to be placed in sleeve. In the case of new construction, all sleeves are to be placed prior to laying of any hard surface. In the case of existing construction, the sleeves must be installed by boring under the existing hard surface.

3.11 QUICK COUPLERS

A. Quick couplers shall be installed on a swing joint as detailed on the drawings.

B. Install one (1) quick coupler at each remote control valve or valve cluster.

3.12 TESTING

A. Operation Testing: After finish grading, contouring and mulching, test the entire system for operation including electrically actuating the remote control valve. Run the system until water begins to puddle and/or run off to determine the initial controller run time to determine the number of irrigation cycles necessary to meet weekly evapotranspiration rates (E.T.) for the plant material installed.

3.13 ADJUSTMENT

A. After completion of grading, seeding, or sodding, and rolling of grass areas, carefully adjust lawn sprinkler heads so they will be flush with, or not more than 1/2" below finish grade.

3.14 CLEAN-UP

A. Remove from the site all debris resulting from work of this section.

END OF SECTION 02810

SECTION 02900

LANDSCAPING

PART 1 - GENERAL

1.1 SUMMARY

A. The Extent of the landscape development work is shown on the drawings and schedules and includes preparation of landscaped areas, restoration of areas disturbed by construction, and placement of all plant materials bark mulch, and sod.

1.2 AS-BUILT DRAWINGS

A. The Contractor will keep a record of all departures from the contract drawings that occur during construction. These shall be kept on a clean set of prints of the contract drawings. The Engineer will review the "as-built drawings" to verify that changes are being recorded as construction occurs.

1.3 QUALITY ASSURANCE

A. The landscape work shall be done by a single licensed Landscape Contractor specializing in landscape work. The on site supervisor must have a minimum of three years experience in landscape construction and one year experience in a supervisory role.

1.4 PLANT MATERIAL SOURCE QUALITY CONTROL

A. General: Ship landscape materials with certificates of inspection as required by governmental authorities. Comply with governing regulations applicable to landscape materials.

B. The source or supplier for all plant materials shall be furnished to the Engineer prior to the delivery of any plant materials on site or stored elsewhere.

D. Provide trees other plant materials grown in a recognized nursery in accordance with good horticultural practice. Provide healthy, vigorous stock grown under climatic conditions similar to the locality of the project and free of disease, insects, eggs, larvae, and defects such as knots, sun-scale, injuries, abrasions, or disfigurement.

E. Plant materials and other landscape items will be evaluated according to compliance with drawings, schedules, and specifications; as well as overall aesthetic quality, grower or supplier reputation, physical inspection, and American Association of Nurseryman Standards (AANS).

F. All plant materials are to be inspected at the time of delivery on site. This approval does not constitute final acceptance of any plant material. All plant materials will be inspected again at time of final inspection and once again at the end of the guarantee period. Any plant found to

be unacceptable at any of these inspections shall be immediately removed and replaced.

1.5 PLANT MATERIALS

A. Trees, shrubs, and other plants: Do not prune prior to delivery. Do not bend or bind-tie in such a manner as to damage bark, break branches or destroy natural shape. Provide protective covering during delivery.

B. Deliver Plants after preparations for planting have been completed and plant immediately. If planting is delayed more than 6 hours after delivery, set plants in shade, protect from weather and mechanical damage, and keep roots moist.

C. Do Not remove container grown stock from container until planting time.

D. Label at least one plant of each variety with a securely attached waterproof tag bearing legible designation of botanical and common name.

E. Substitutions: If specified landscape material is not obtainable, submit in writing proof of non-availability and a proposal for use of equivalent material for evaluation to be accepted or rejected prior to the bid.

F. Sizes: Provide plants of the sizes shown or specified. Plants of a larger size may be used pending approval by the Engineer and if sizes of root balls or containers are increased proportionately.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery, and while stored at the site.

1.7 GRADING AND TOPSOIL

A. Examine the subgrade, verify the elevations to be no more than 2" above or below subgrade elevation which should allow for 24" of topsoil and 3" of bark mulch in all tree planter areas, and 6" of topsoil in all sod areas. Observe the conditions under which work is to be performed, and notify the Engineer of unsatisfactory conditions.

B. Topsoil is to be placed at the depths specified in sod and tree planter areas.

1.8 EXISTING UTILITIES

A. Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required, to minimize possibility of damage to underground utilities. The Contractor shall have the area "Blue Staked" prior to digging. It is the responsibility of the Contractor to repair or replace any damage incurred by the contractor or

the contractor's employees at no expense to the owner.

1.9 EXCAVATION

A. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify the Engineer before planting.

1.10 PLANTING SCHEDULE

A. Prepare a proposed planting schedule for approval by the Engineer. Schedule the dates for each type of landscape work during the normal seasons for such work in the area of the site. Correlate with specified maintenance periods to provide maintenance throughout the specified time period. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.

B. Proceed with and complete the landscape work as rapidly as portions of the site become available, working within the seasonal limitations for each kind of landscape work required.

1.11 GUARANTEE

A. Guarantee trees, shrubs and other plants for one year following substantial completion of Landscape work.

B. Remove and replace trees, shrubs or other plant material found to be unacceptable at the time of substantial completion and once again at the end of the guarantee period. Replacements shall be made during the growing season and shall comply with all requirements and specifications. Any delay in the completion of any item of work in the planting operation which extends the planting into more than one season shall extend the guarantee period accordingly.

C. Guarantee lawns through the specified maintenance period.

PART 2 - MATERIALS:

2.1 TOPSOIL

A. Topsoil: All topsoil is to be imported topsoil which shall consist of natural sandy loam and be of uniform quality, free from subsoil, hard clods, stiff clay, hard-pan, sod, partially disintegrated debris or any other undesirable material. Soil shall be free of plants roots or seeds that would be toxic or harmful to growth. Topsoil shall be obtained from naturally drained areas and shall have an acidity range from 5.5 to 7.7 inclusive.

C. Contractor shall furnish a certified report from an approved analytical chemist showing the analysis of the topsoil proposed for use. Furnish sample of topsoil to Engineer prior to delivery of topsoil on site.

1. Prior to the installation of any topsoil, contractor shall inspect the existing subgrade for compliance with the specifications with regards to the grade and cleanliness. Any discrepancy shall be brought to the attention of the Engineer for appropriate action.

2. Spread the topsoil to a minimum of 6" of topsoil in all lawn areas.

2.2 PLANT MATERIALS:

A. Quality: Provide trees, shrubs and other plants that comply with the recommendations and requirements of ANSI 260.1 "Standard for Nursery Stock" and as further specified. The Engineer reserves the right to refuse plant materials which do not meet the quality required for the project.

B. Deciduous Trees: Provide trees of height and caliper listed or shown and with minimum branching configuration recommended by ANSI 260.1 for type and species required. Provide single stem trees except where special forms are shown or listed.

C. Provide balled and burlapped (B &B) deciduous trees.

D. Container grown deciduous trees will be acceptable in lieu of balled and burlapped deciduous trees and where specified in plant schedule subject to specified limitations of ANSI 260.1.

2.3 GRASS MATERIALS

A. Sod: All sod shall be two year old Kentucky Blue and Merian Grass that has been cut fresh the morning of installation. Only sod that has been grown in a commercial sod farm shall be used, Do not use sod from any other source. All sod that has not been laid with 24 hours shall be deemed unacceptable and shall be removed from the site.

2.4 MISCELLANEOUS MATERIALS

A. Bark Mulch: This material shall be a clean medium coarseness shredded bark mulch. All shrub planting beds and tree basins shall receive a 3" mulch layer.

B. Chemical Fertilizer: Fertilizer for trees and shrubs shall be 21 gram (20-10-5) fertilizer tablets. Fertilizer shall be added at the time of planting as per the Manufacturer's recommendations. Fertilizer for lawns and ground covers shall be 16-16-8 with guaranteed chemical analysis marked on container.

PART 3 - EXECUTION

3.1 COORDINATION

A. The contractor shall coordinate his work with that of other contractors on site, and shall cooperate to the fullest extent to see that the work is completed in a timely and workmanship like manner.

B. The Landscape contractor shall coordinate his work with the removal of the existing curb and gutter. Work is to be preformed in a mannor that minimizes the amount of damage to the landscape.

3.2 INSTALLATION OF TOPSOIL

A. Prior to the installation of any topsoil, contractor shall inspect the existing subgrade for compliance to the specifications with regards to the grade and cleanliness. Any discrepancy shall be brought to the attention of the Engineer for appropriate action.

B. When contract operations have been completed to a point where the areas will not be disturbed, subgrade shall be cleaned free of waste material of all kinds. Scarify and pulverize the subgrade to a depth of not less than 6" inches. Scarification shall be completed in all areas that are to be planted or sodded or are to receive topsoil.

D. Spread the topsoil mix to a minimum depth of 6" in all lawn areas. Do not place topsoil over subgrade that is frozen or damp.

3.3 PREPARATION FOR SOD

A. The surface on which the sod is to be installed shall be firm and free of footprints, depressions or undulations of any kind. The surface shall be free of all rocks larger than 1/2" in diameter and all sticks, roots, rubbish, and other extraneous materials. NO EXCEPTIONS.

B. The finish grade of the topsoil adjacent to all sidewalks, etc., prior to sodding shall be 1" below the top surface of the concrete or hard surface.

c. If a crust has formed on the topsoil, it shall be loosened by raking prior to sodding.

3.4 PREPARATION FOR PLANTING TREES AND SHRUBS

A. The exact locations of all plants must be approved by the College prior to the digging of any holes. Refer to the drawings for the sizes and preparation of holes. Prepare all holes according to the details on the drawings.

B. To avoid a soil water interface problem, excavated soil material from planting holes should be inspected by the Engineer to determine if such soil should be used as backfill material. If it is determined that the excavated material is not of good quality, then it should be modified.

3.5 TREE, SHRUB AND PRENNIAL PLANTING

A. Prior to planting, fill excavated tree pit with water and allow to percolate out. If, after 24 hours, the water has not percolated out of the pit, notify the Engineer. Do not plant until the problem has been corrected.

B. The tree and shrub planting holes should be the same depth as the rootball. Trees must be placed on undisturbed soil at the bottom of the planting hole. The tree hole depth shall be determined so that the tree may be set at finish grade, using the top of the root ball as a guide.

C. Set tree on soil, cut wire basket, remove burlap from top 1/3 of ball, and remove ALL twine, wrappings, etc..

D. All tree holes shall be backfilled in 12 inch lifts and settled and tamped to minimize any settling of the tree.

E. Upon completion of backfilling operation, thoroughly water the tree to completely settle the soil and fill any voids that may have occurred.

F. The amount of pruning shall be limited to the minimum necessary to remove dead or injured twigs and branches. All cuts, scars and bruises shall be properly treated according to the direction of the Engineer. Proper pruning techniques shall be used. Do NOT leave stubs and do NOT cut the leader branch. Improper pruning shall be cause for rejection of the plant material.

G. Saucers: Saucer shall be formed at the base and it shall be watered the same day as planting.

H. Mulching: Upon completion of all planting operations, remove all undesirable material from the surface of the planting beds, including all rocks over the size of 1" diameter. Install the specified mulch in all shrub planting beds and tree basins to a uniform depth of 3".

I. No concrete shall be allowed in the subgrade, below planting areas.

J. Planting hole size shall be a min. of 2x root ball width.

3.6 SOD

A. Prior to laying of sod, the entire surface to receive sod shall be uniformly covered with the specified fertilizer at the rate of 5 pounds per 1000 square feet.

B. Upon completion of the laying operation, an inspection of the area shall be made. All voids and large cracks between individual pieces of sod shall be filled with topsoil, prior to watering. Upon completion of filling all voids in the newly laid sod areas, the sod is to be completely saturated with water.

C. Watering of the sod shall be the complete responsibility of the contractor. Provide acceptable visual barriers by means of barricades set at appropriate distances and strings or tapes between the

barriers as an indication of new work. Restore any damaged areas caused by others, erosion, or vehicular traffic until such a time as the lawn is accepted by the owner.

3.8 MAINTENANCE

A. Begin maintenance immediately after planting.

B. Maintain plants until Final Acceptance but in no case less than four (4) growing months (April - September) after Substantial Completion.

1. Maintain plants by watering, pruning, cultivating and weeding as required for healthy growth. Restore planting saucers. Spray as required to keep plant materials free of insects and disease. Replace bark mulch to maintain a depth of 3".

2. The contractor shall instruct the owner as to the watering requirements and shall monitor such operations at all times. The contractor shall be held responsible for failure to monitor the watering requirements and shall be held responsible to replace any or all plants that are lost due to improper application of water.

C. Maintain lawns for not less than the period stated below, and longer as required to establish an acceptable lawn.

1. Not less than four (4) growing months (April to September), and a minimum of four (4) mowings, after Substantial Completion.

2. If installed in fall and not given full four months of maintenance, or if not considered acceptable at that time, continue maintenance the following spring until acceptable lawn is established.

3. The contractor shall be responsible for the protection, watering and replacement of any damaged lawn until acceptance by the owner. This guarantee shall include repairing of any eroded places and maintaining the lawn by watering, mowing and controlling of insects as well as advising the owner of any maintenance or watering procedures necessary to care for and promote plant life. All lawn must be in satisfactory condition at the time of the final acceptance.

4. The Contractor shall fertilize new sod with 16-16-8 after sod is established.

3.9 CLEANUP AND PROTECTION

A. During landscape work store materials and equipment where directed. Keep pavements clean and work area in an orderly condition.

B. Protect landscape areas, work and materials from damage due to operations by other contractors, trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged landscape work as directed.

C. The contractor shall keep the site free from accumulation of waste material. At the time of completion, all areas must be swept or washed clean and all rubbish removed to the satisfaction of the Engineer.

3.10 INSPECTION AND ACCEPTANCE

A. Substantial Completion for landscape work.
1. When the landscape work is completed, including maintenance, the Engineer will, upon request, make an inspection to determine acceptability.

2. The landscape work may not be inspected for acceptance in parts.

3. Where inspected landscape work does not comply with the requirement, replace rejected work and continue specified maintenance until re-inspected by the Engineer and found to be acceptable. Remove rejected plants and materials promptly from the project site.

4. As-built Drawings shall be furnished to the Engineer at the time of the Substantial Completion Inspection before final acceptance.

END OF SECTION 02900

SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Raceways.
2. Building wire and connectors.
3. Supporting devices for electrical components.
4. Electrical identification.
5. Electricity-metering components.
6. Concrete equipment bases.
7. Electrical demolition.
8. Cutting and patching for electrical construction.
9. Touchup painting.
10. Submittals.
11. Workmanship.
12. Coordination drawings.
13. Record documents.
14. Drawings and Specifications.
15. Maintenance manuals.
16. Rough-ins.
17. Electrical installations.
18. Cutting and patching.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. FMC: Flexible metal conduit.

C. IMC: Intermediate metal conduit.

D. LFMC: Liquidtight flexible metal conduit.

E. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

A. Product Data: Follow the procedure specified in Division 1 Section “Submittals”.

B. Shop Drawings: Dimensioned plans and sections or elevation layouts of electricity-metering equipment.

C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

D. Additional copies may be required by individual sections of these Specifications.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

1.6 COORDINATION

A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.

1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.

B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.

C. Coordinate electrical service connections to components furnished by utility companies.

1. Coordinate installation and connection of exterior underground utilities and services, including provision for electricity-metering components.
2. Comply with requirements of authorities having jurisdiction and of University of Utah.

D. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces. Access doors and panels are specified in Division 8 Section "Access Doors."

E. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.

F. Where electrical identification markings and devices will be concealed by acoustical ceilings and similar finishes, coordinate installation of these items before ceiling installation.

G. Prepare coordination drawings in accordance with Division 1 Section “Project Coordination”, to a scale of ¼”=1’-0”, or larger; detailing major elements, components, and systems of electrical equipment and materials in relationship with other systems, installation, and building components. Indicate locations where spaces is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the dwork, including but not limited to the following:

1. Indicate the proposed locations of the major raceway systems, equipment and materials. Including the following:

a. Clearance for servicing equipment, including space for equipment disassembly required for periodic maintenance.

b. Exterior wall and foundation penetrations.

c. Fire rated wall and floor penetrations.

d. Equipment connections and support details.

e. Sizes and location of required concrete pad and bases.

1.7 WORKMANSHIP

A. All materials and equipment shall be installed in accordance with the recommendations of the manufacturer to conform with the contract documents. The installation shall be accomplished by workmen skilled in the type of work involved.

B. The Electrical Contractor shall have a licensed or certified Master Electrician assigned to direct the electrical work and to coordinate work with the General Contractor and other trades. Furthermore, a licensed or certified journeyman electrician shall be assigned to supervise the actual performance of all electrical work under Division 16. All installers must be certified journey man.

1. All workmen doing electrical work of any nature must at all times carry their electrician's license with them and show it upon request.

2. The licensed or certified journeyman assigned to supervise the performance of Division 16 electrical work, shall be required to be on the job site at all times, while Division 16 work is being performed.

C. The installation shall conform to the applicable rules of the National Electrical Code and National Electrical Safety Code except where more stringent requirements are noted in these specifications. Conflicts shall be brought to the attention of the Architect/Engineer.

D. The Contractor and Sub-contractors shall comply with OSHA and EPA Standards while in the performance of this contract.

1.8 SUBSTITTIONS

A. The equipment specified carries brand names and catalog numbers and shall be interpreted as establishing a standard of quality. Use only specified items or those listed by addenda.

B. Any conflict arising from the use of substituted equipment shall be the responsibility of the supplier, who shall bear all costs required to make the equipment comply with the intent of the plans and specifications.

C. At the option of the Architect, samples may be required for non-standard items before installation during construction.

D. No materials or apparatus shall be substituted after the bid opening except where the equipment manufacturer has been discontinued or delivery becomes a problem, then written approval of the Architect is required.

1.9 RECORD DOCUMENTS

A. Prepare record documents in accordance with the requirements in Division 1 Section "PROJECT CLOSEOUT." In addition to the requirements specified in Division 1, indicate installed conditions for:

1. Major raceway systems, size and location, for both exterior and interior; locations of control devices; distribution and branch electrical circuitry; and fuse and circuit breaker size and arrangements.

2. Equipment locations (exposed and concealed), dimensioned from prominent building lines.

PART 2 - PRODUCTS

A. NOT USED.

PART 3 - EXECUTION

3.1 ELECTRICAL EQUIPMENT INSTALLATION

A. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

B. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

C. Right of Way: Give to raceways and piping systems installed at a required slope.

3.2 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger, in both directions, than supported unit. Follow supported equipment manufacturer's anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."

3.3 DEMOLITION

A. Protect existing electrical equipment and installations indicated to remain. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, and functionality.

B. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety.

C. Abandoned Work: Cut and remove buried raceway and wiring, indicated to be abandoned in place, 2 inches below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.

D. Remove demolished material from Project site.

E. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.

3.4 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.

B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

3.5 FIELD QUALITY CONTROL

A. Inspect installed components for damage and faulty work, including the following:

1. Raceways.
2. Building wire and connectors.
3. Supporting devices for electrical components.
4. Electrical identification.
5. Electricity-metering components.
6. Concrete bases.
7. Electrical demolition.
8. Cutting and patching for electrical construction.
9. Touchup painting.

B. Test Owner's electricity-metering installation for proper operation, accuracy, and usability of output data.

1. Connect a load of known kW rating, 1.5 kW minimum, to a circuit supplied by the metered feeder.
2. Turn off circuits supplied by the metered feeder and secure them in the "off" condition.
3. Run the test load continuously for eight hours, minimum, or longer to obtain a measurable meter indication. Use a test load placement and setting that ensure continuous, safe operation.
4. Check and record meter reading at end of test period and compare with actual electricity used based on test load rating, duration of test, and sample measurements of supply voltage at the test load connection. Record test results.
5. Repair or replace malfunctioning metering equipment or correct test setup; then retest. Repeat for each meter in installation until proper operation of entire system is verified.

3.6 REFINISHING AND TOUCHUP PAINTING

A. Refinish and touch up paint. Paint materials and application requirements are specified in Division 9 Section "Painting."

1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.7 CLEANING AND PROTECTION

A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.

B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION 16050

SECTION 16521

EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Exterior luminaires with lamps and ballasts, but not mounted on exterior surfaces of buildings.
2. Luminaire-mounted photoelectric switches.

B. Related Sections include the following:

1. Division 2 Section "Lighting Poles and Standards" for poles and other support structures and for requirements of resistance to wind loads.

1.3 SUBMITTALS

A. Product Data: For each luminaire, arranged in the order of lighting unit designation. Include data on features, accessories, finishes, and the following:

1. Physical description of fixture, including dimensions and verification of indicated parameters.
2. Luminaire dimensions, effective projected area, details of attaching luminaires, accessories, and installation and construction details.
3. Luminaire materials.
4. Photoelectric relays.
5. Fluorescent and high-intensity-discharge ballasts.
6. Fluorescent and high-intensity-discharge lamps.
7. Electrical and energy-efficiency data for ballasts.

B. Shop Drawings: Anchor-bolt templates keyed to specific poles and certified by manufacturer.

C. Wiring Diagrams: Power, signal, and control wiring.

D. Coordination Drawings: Mounting and connection details, drawn to scale, for exterior luminaires with requirements specified in Division 2 Section "Lighting Poles and Standards."

E. Samples for Verification: For exterior luminaires designated for sample submission in the Exterior Luminaire Schedule.

1. Lamps: Specified units installed.
2. Ballast: 120-V models of specified ballast types.
3. Finishes: For each finished metal used in support components.

F. Source quality-control test reports.

G. Field quality-control test reports.

H. Operation and Maintenance Data: For luminaires to include in maintenance manuals.

I. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. FMG Compliance: Fixtures for hazardous locations shall be listed and labeled for indicated class and division of hazard by FMG.

C. Comply with IEEE C2, "National Electrical Safety Code."

D. Comply with NFPA 70.

1.5 COORDINATION

A. Coordinate exterior luminaires with mounting and wind load requirements in Division 2 Section "Lighting Poles and Standards."

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace luminaires or components of luminaires and lamps that fail in materials or workmanship; corrode; or fade, stain, or chalk due to effects of weather or solar radiation within specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs or alterations from special warranty coverage.

1. Warranty Period for Luminaires: Five years from date of Substantial Completion.

a. Warranty Period for Metal Corrosion: Five years from date of Substantial Completion.
b. Warranty Period for Color Retention: Five years from date of Substantial Completion.

2. Warranty Period for Lamps: Replace lamps and fuses that fail within 12 months from date of Substantial Completion; furnish replacement lamps and fuses that fail within the second 12 months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Products: Subject to compliance with requirements, provide one of the products specified.

2.2 LUMINAIRES, GENERAL

A. Complying with UL and listed for installation in wet locations.

B. Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.

C. Metal Parts: Free of burrs and sharp corners and edges.

D. Sheet Metal Components: Corrosion-resistant aluminum, unless otherwise indicated. Form and support to prevent warping and sagging.

E. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.

F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Designed to disconnect ballast when door opens.

G. Exposed Hardware Material: Stainless steel.

H. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

I. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:

1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.

J. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

2.3 EXTERIOR LUMINAIRES

1. Refer to Light fixtures schedule.

2.4 PHOTOELECTRIC RELAYS

A. UL 773 or UL 773A listed, factory mounted to the luminaire.

B. Contact Relays: Single throw, designed to fail in the on position, and factory set to turn light unit on at 1.5 to 3 fc and off at 4.5 to 10 fc with 15-second minimum time delay.

1. Relay with locking-type receptacle shall comply with NEMA C136.10.
2. Adjustable window slide for adjusting on-off set points.

2.5 HIGH-INTENSITY-DISCHARGE LAMP BALLASTS

A. General: Comply with NEMA C82.4 and UL 1029. Shall include the following features, unless otherwise indicated:

1. Type: Constant-wattage autotransformer or regulating high-power-factor type.
2. Minimum Starting Temperature: Minus 22 deg F for single-lamp ballasts.
3. Normal Ambient Operating Temperature: 104 deg F.
4. Open-circuit operation will not reduce average life.
5. Ballast Fuses: One in each ungrounded power supply conductor. Voltage and current ratings as recommended by ballast manufacturer.

B. Auxiliary, Instant-On, Quartz System: Automatically switches quartz lamp on when fixture is initially energized and when momentary power outages occur. Automatically turns quartz lamp off when high-intensity-discharge lamp reaches approximately 60 percent light outpu

2.6 HIGH-INTENSITY-DISCHARGE LAMPS

A. Metal-Halide Lamps: ANSI C78.1372, wattage and burning position as scheduled, CRI 65 (minimum), and color temperature 4000.

2.7 FACTORY FINISHES

A. Field Painting Finish: Manufacturer's standard prime-coat finish ready for field painting.

B. Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match process and color of pole or support materials specified in Division 2 Section "Lighting Poles and Standards."

C. Factory-Painted Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
2. Interior Surfaces: Apply one coat of bituminous paint on interior of pole, or otherwise treat to prevent corrosion.
3. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
    a. Color: Match Architect's sample of manufacturer's standard color.

D. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax.
3. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.

    a. Color: As required by Architect.

4. Gold Anodic Finish: AA-M32C22A43 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, impregnated color coating 0.018 mm or thicker) complying with AAMA 611.

2.8 SOURCE QUALITY CONTROL

A. Provide services of a qualified, independent testing and inspecting agency to factory test luminaires with ballasts and lamps; certify results for isofootcandle curves, zonal lumen, average and minimum ratios, and electrical and energy-efficiency data for ballasts.

B. Factory test fixtures with ballasts and lamps; certify results for isofootcandle curves, zonal lumen, average and minimum ratios, and electrical and energy-efficiency data for ballasts.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install lamps in each fixture.

B. Luminaire Attachment: Fasten to indicated structural supports.

C. Adjust luminaires that require field adjustment or aiming.

3.2 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 FIELD QUALITY CONTROL

A. Inspect each installed fixture for damage. Replace damaged fixtures and components.

B. Tests and Observations: Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source. Measure light intensities at night. Use photometers with calibration referenced to NIST standards. Comply with the following IESNA testing guide(s):

1. IESNA LM-5.
2. IESNA LM-50.
3. IESNA LM-52.
4. IESNA LM-64.
5. IESNA LM-72.

C. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

END OF SECTION 16521

State of Utah–Department of Administrative Services

DIVISION OF FACILITIES CONSTRUCTION
AND MANAGEMENT

4110 State Office Building/Salt Lake City, Utah 84114/538-3018

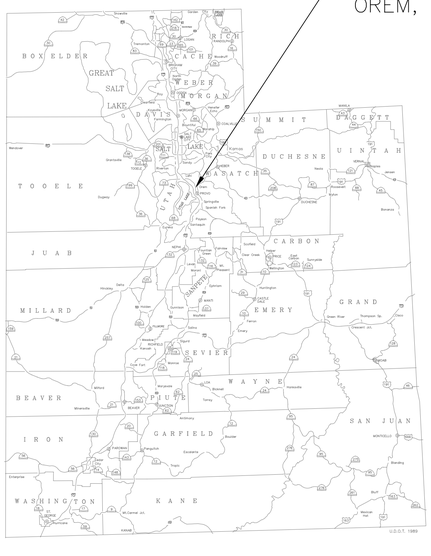
STATE OF UTAH
DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT

UTAH VALLEY STATE COLLEGE
LOT V PHASE II
PARKING LOT EXPANSION
PROJECT NO. 06227790

PROJECT NOTES

1. ANY KNOWN SEWER MAINS, WATER MAINS, GAS MAINS, STORM DRAINS, IRRIGATION LINES, TELEPHONE CONDUITS, ELECTRIC CABLES, AND OTHER UNDERGROUND STRUCTURES ARE SHOWN ON THE DRAWINGS ONLY TO THE EXTENT SUCH INFORMATION HAS BEEN MADE AVAILABLE TO OR DISCOVERED BY THE ENGINEER. IT IS EXPECTED THAT THERE MAY BE DISCREPANCIES AND OMISSIONS IN THE LOCATION AND QUANTITIES OF UTILITIES AND STRUCTURES SHOWN. THIS INFORMATION IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR BUT IS NOT GUARANTEED TO BE EITHER CORRECT OR COMPLETE, AND ALL RESPONSIBILITY FOR THE ACCURACY AND COMPLETENESS THEREOF IS EXPRESSLY DISCLAIMED. THE CONTRACTOR SHALL MAKE SUCH INVESTIGATION AS HE THINKS NECESSARY TO VERIFY ITS CORRECTNESS AND COMPLETENESS. THE CONTRACTOR SHALL, AHEAD OF EXCAVATOR, LOCATE UNDERGROUND UTILITIES AND STRUCTURES, SO THAT THEY WILL NOT BE ACCIDENTALLY CUT OR DAMAGED BY HIS CONSTRUCTION OPERATION, AND SO THAT THE GRADE OF THE PIPE CAN BE ADJUSTED AS REQUIRED.
2. CONTRACTOR SHALL CONTACT BLUE STAKE LOCATION CENTER AT LEAST 48 HOURS BEFORE ANY EXCAVATION IS COMMENCED.
3. SEWER, GAS AND OTHER SERVICES TO INDIVIDUAL STRUCTURES, THOUGH NOT SHOWN FOR CLARITY, DO EXIST AND SHALL BE AVOIDED AT NO ADDITIONAL COST TO THE OWNER
4. OTHER UTILITY SERVICES SHALL BE RELOCATED AS NECESSARY AT NO COST TO THE OWNER
5. CONTRACTOR SHALL PROVIDE NECESSARY FIELD ENGINEERING AND CONSTRUCTION STAKING
6. THE SUCCESSFUL PERFORMANCE OF FIELD DENSITY TESTS SHALL NOT RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITY TO MEET THE SPECIFIED DENSITY REQUIREMENTS FOR THE COMPLETE PROJECT. THE CONTRACTOR SHALL MAKE SUCH ADDITIONAL TESTS, AT HIS EXPENSE, AS MAY BE REQUIRED TO INSURE THAT THE WORK OF COMPACTION IS PERFORMED PROPERLY.
7. ALL RESTORATION OF SURFACE IMPROVEMENTS SHALL BE IN ACCORDANCE WITH UVSC STANDARDS
8. ACCESS TO THE CONSTRUCTION SITE SHALL BE FROM 800 SOUTH STREET. CONTRACTOR SHALL KEEP 800 SOUTH STREET CLEAN AND SWEPT.
9. CONTRACTOR TO NOTIFY UVSC AND DFCM STAFF 48 HOURS PRIOR TO EXCAVATING.
10. CONTRACTOR TO SET MANHOLE RINGS AND LIDS, VALVE BOXES, ETC. AS REQUIRED SO THAT TOPS ARE FLUSH WITH, OR A MAXIMUM OF 1/4" BELOW, THE NEW FINISH GRADE.
11. CONTRACTOR SHALL PROVIDE AN ON-SITE TOILET FOR THE DURATION OF THE PROJECT.
12. CONTRACTOR SHALL PROVIDE A WATER TRUCK AND DUST CONTROL FOR THE DURATION OF THE PROJECT AS PART OF HIS BID.

UTAH



VICINITY MAP

INDEX TO SHEETS

REGISTERED PROFESSIONAL ENGINEER
JONATHAN E. KING
179735
STATE OF UTAH

CONSTRUCTION SET

King Engineering, Inc.
2825 E Cottonwood Parkway
Salt Lake City, Utah 84121
Phone: 801.990.3170
Fax: 801.990.3293
Internet: www.pavementmanagement.com

CREATED BY: KING ENGINEERING, INC.

UVSC PARKING LOT V PHASE II

SITE/LOCATION:
UTAH VALLEY STATE COLLEGE
800 S. 1200 W.
OREM, UTAH

PROJECT TITLE:
PARKING LOT V
PHASE II

MARK	DATE	DESCRIPTION

ISSUE TYPE: CONSTRUCTION SET

ISSUE DATE: MAY 26, 2006

DFCM PROJECT NO: 06227790
CAD PROJECT NO: 02-XXX
CAD DWG FILE: G-001.DWG
DRAWN BY: JEK
CHK'D BY: JEK

SHEET TITLE
TITLE SHEET

SHEET NUMBER
G-001

NORTH

0 40

SCALE 1"=40'

King Engineering, Inc.
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DFCM PROJECT NO: 06227790
CAD PROJECT NO: 02-XXX
CAD DWG FILE: C-101.DWG
DRAWN BY: JEK
CHK'D BY: JEK
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REGISTERED PROFESSIONAL ENGINEER — 179735 — JONATHAN E. KING — STATE OF UTAH

SHEET TITLE

DEMOLITION AND SITE PREPARATION

SHEET NUMBER

C-101

SHEET 2 OF 11

NORTH

0 40

SCALE 1"=40'

NOTES ON GRADING:

1. CONTRACTOR SHALL STRAIGHT GRADE BETWEEN GIVEN FINISHED GRADE ELEVATIONS (TBC, TOA, FG, ETC.) UNLESS OTHERWISE NOTED.

2. THE CONTRACTOR MAY SCALE THE DISTANCES FOR THE LOCATIONS OF THE FINISH GRADE ELEVATIONS AT THE CENTER AND TOP OF LANDCAPED BERM.

3. THE CONTRACTOR SHALL PROVIDE CONSTRUCTION STAKING.

4. QUESTIONS REGARDING SURVEY CONTROL MAY BE DIRECTED TO NOEL EVANS, RLS AT JOHN FRANCOM AND ASSOCIATES AT 801.295.7500

6" PVC SLEEVE

1200 WEST STREET

800 SOUTH STREET

EXISTING STORMWATER DETENTION AT SWALE AND PARKING LOT

MATCH GRADE OF EXISTING AT LIMITS (TYP.)

MATCH EXISTING

CROWNED BERM SECTION DETAIL K SHEET C-501

CROWNED BERM SECTION DETAIL K SHEET C-501

FURNISH AND INSTALL APPROXIMATELY 25 L.F. OF NEW CONCRETE MOW STRIP. SEE DETAIL L SHEET C-501.

FURNISH AND INSTALL APPROXIMATELY 25 L.F. OF NEW CONCRETE MOW STRIP. SEE DETAIL L SHEET C-501.

30

N 5559.84
E 2893.16
ELEV. 4582.37
DESC. TBC-COR

N 5559.14
E 2903.21
ELEV. 4582.62
DESC. TBC-COR

N 5562.74
E 3024.13
ELEV. 4586.26
DESC. TBC-COR

N 5863.03
E/3034.13
/ELEV. 4586.66
DESC. TBC-COR

N 5598.99
E 3197.02
ELEV. 4591.95
DESC. TBC-COR

100' FLAT BERM SECTION

END CROWNED BERM SECTION DETAIL I SHEET C-501

FURNISH AND INSTALL APPROXIMATELY 842 L.F. OF NEW CONCRETE CURB AND GUTTER. SEE DETAIL B SHEET C-501.

FURNISH AND INSTALL APPROXIMATELY 543 L.F. OF NEW CONCRETE CURB AND GUTTER. SEE DETAIL B SHEET C-501.

GRADE LANDSCAPED BERM FLAT TBC ON WEST TO EXISTING GROUND ON EAST FOR 100 FEET/SOUTH OF TBC-COR (FOR FUTURE ACCESS))

10' TYP.

FURNISH AND INSTALL APPROXIMATELY 978 L.F. OF NEW CONCRETE CURB AND GUTTER. SEE DETAIL B SHEET C-501.

4590.44
FG

25'-0" (TYP.)

MATCH GRADE OF EXISTING AT LIMITS (TYP.)

N 5298.74
E 2893.95
ELEV. 4580.20
DESC. TBC-COR

N 5299.99
E 2903.94
ELEV. 4580.15
DESC. TBC-COR

N 5302.00
E 3024.91
ELEV. 4584.27
DESC. TBC-COR

N 5302.27
E 3034.91
ELEV. 4584.22
DESC. TBC-COR

29

N 5271.72
E 2894.08
ELEV. 4579.59
DESC. TBC-COR

N 5271.99
E 2904.08
ELEV. 4579.89
DESC. TBC-COR

N 5274.97
E 3025.08
ELEV. 4583.67
DESC. TBC-COR

N 5275.23
E 3035.08
ELEV. 4583.97
DESC. TBC-COR

FURNISH AND INSTALL APPROXIMATELY 500 L.F. OF NEW CONCRETE CURB AND GUTTER. SEE DETAIL B SHEET C-501.

FURNISH AND INSTALL APPROXIMATELY 500 L.F. OF NEW CONCRETE CURB AND GUTTER. SEE DETAIL B SHEET C-501.

BEGIN CROWNED BERM SECTION DETAIL I SHEET C-501

4588.81
FG

STRAIGHT GRADE BERM SECTION DETAIL J SHEET C-501

4590.77
FG

CENTERLINE OF NEW LANDSCAPED BERM SEE SHEETS L-101, L-102

28

N 5031.84
E 2894.87
ELEV. 4577.68
DESC. TBC-COR

N 5032.13
E 2904.87
ELEV. 4577.63
DESC. TBC-COR

N 5035.21
E 3025.86
ELEV. 4581.74
DESC. TBC-COR

N 5035.46
E 3035.86
ELEV. 4581.68
DESC. TBC-COR

4589.19
FG

MATCH EXISTING

N 5013.26
E 3198.95
ELEV. 4586.48
DESC. TBC-COR

FURNISH AND INSTALL APPROXIMATELY 20 L.F. OF NEW CONCRETE CURB AND GUTTER. SEE DETAIL B SHEET C-501.

REMOVE NATIVE MATERIAL TO DESIGN SUBGRADE AND DISPOSE OF OFF-SITE. APPROXIMATELY 29 C.Y. FURNISH AND INSTALL CONCRETE PAVEMENT. SEE DETAIL G SHEET C-501. APPROXIMATELY 785 S.F.

FURNISH AND INSTALL NEW ASPHALT PAVEMENT. APPROXIMATELY 165,741 S.F. SEE DETAIL A SHEET C-501. STRAIGHT GRADE BETWEEN NEW LIP OF CONCRETE AND EXISTING TOP OF ASPHALT. 6" SLEEVES MUST BE FURNISHED AND INSTALLED BETWEEN ISLANDS (SEE L-101)

REGISTERED PROFESSIONAL ENGINEER #9978 JONATHAN E. KING STATE OF UTAH

King Engineering, Inc.
2825 E Cottonwood Parkway
Salt Lake City, Utah 84121
Phone: 801.990.3170
Fax: 801.990.3293
Internet: www.pavementmanagement.com

CREATED BY: KING ENGINEERING, INC.

UVSC PARKING LOT V PHASE II

SITE/LOCATION:

UTAH VALLEY STATE COLLEGE
800 S. 1200 W.
OREM, UTAH

PROJECT TITLE:

PARKING LOT V
PHASE II

MARK	DATE	DESCRIPTION

ISSUE TYPE: CONSTRUCTION SET

ISSUE DATE: MAY 26, 2006

DFCM PROJECT NO: 06227790
CAD PROJECT NO: 02-XXX
CAD DWG FILE: C-102.DWG
DRAWN BY: JEK
CHK'D BY: JEK

SHEET TITLE

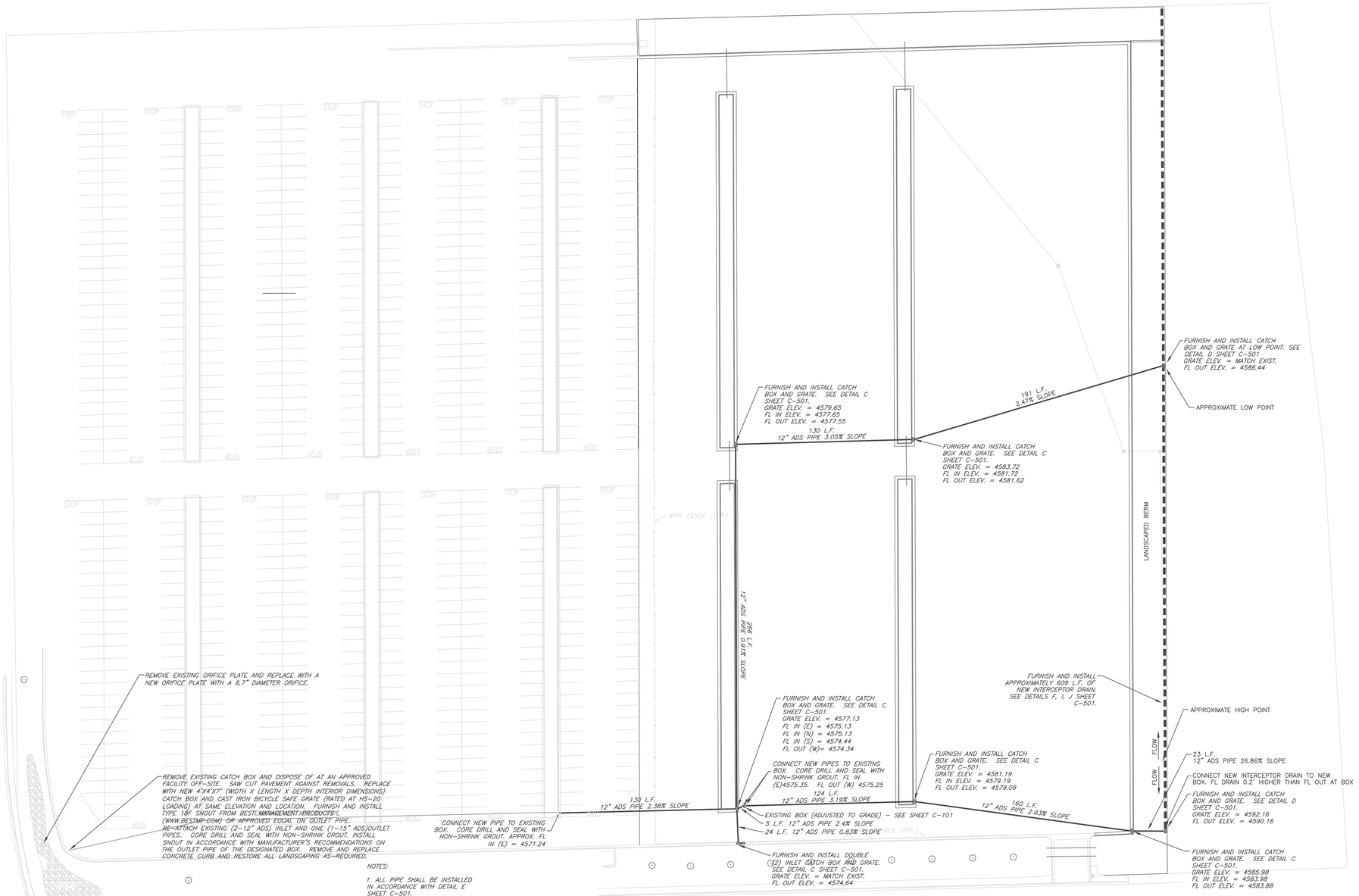
LAYOUT AND GRADING

SHEET NUMBER

C-102

NORTH

0 40
SCALE 1"=40'



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DFCM PROJECT NO: 06227790
CAD PROJECT NO: 02-XXX
CAD DWG FILE: C-103.DWG
DRAWN BY: JEK
CHK'D BY: JEK

SHEET TITLE

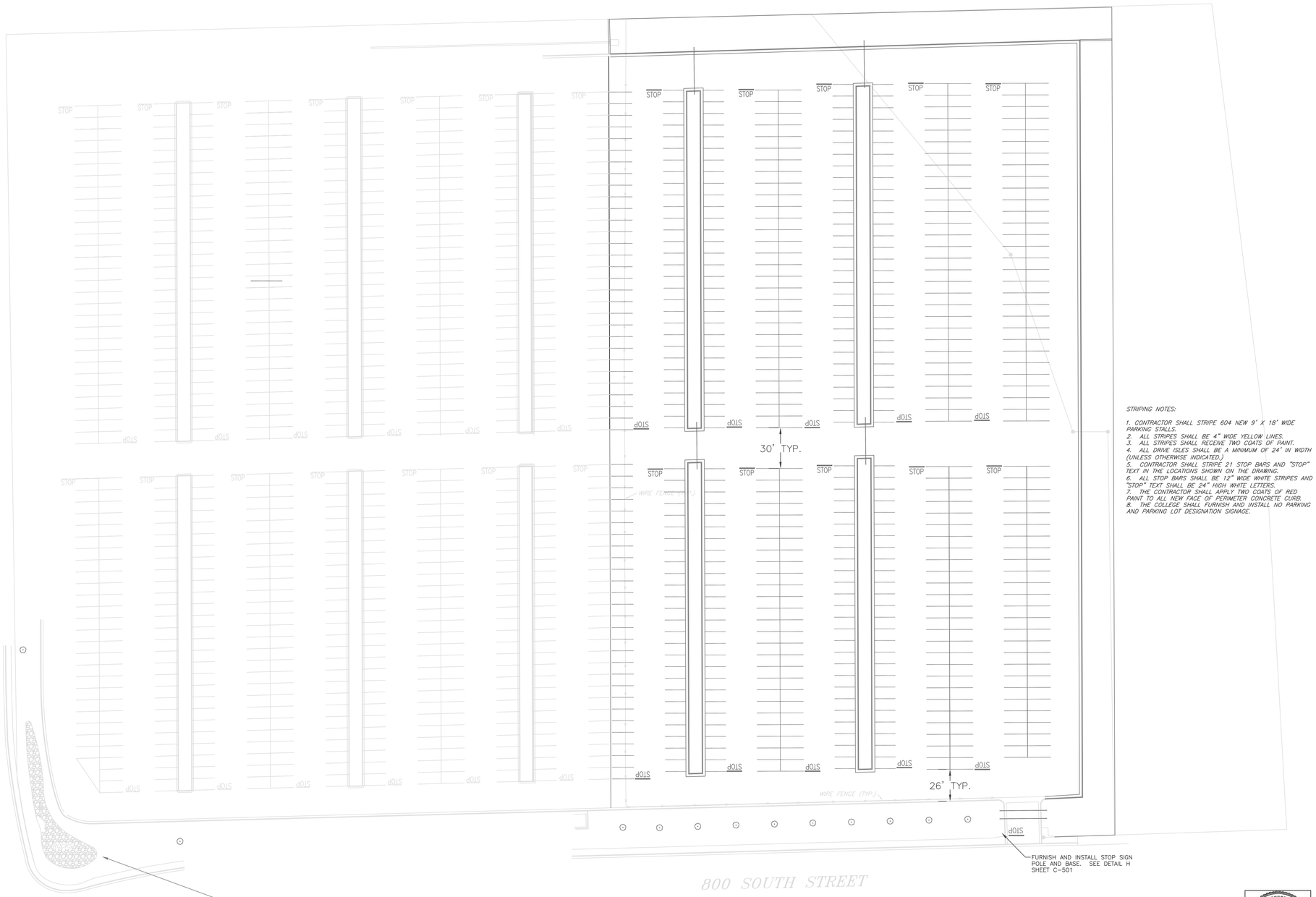
STORM DRAINAGE

SHEET NUMBER

C-103

NORTH

0 40
SCALE 1"=40'



STRIPING NOTES:

1. CONTRACTOR SHALL STRIPE 604 NEW 9' X 18' WIDE PARKING STALLS.
2. ALL STRIPES SHALL BE 4" WIDE YELLOW LINES.
3. ALL STRIPES SHALL RECEIVE TWO COATS OF PAINT.
4. ALL DRIVE ISLES SHALL BE A MINIMUM OF 24' IN WIDTH (UNLESS OTHERWISE INDICATED.)
5. CONTRACTOR SHALL STRIPE 21 STOP BARS AND "STOP" TEXT IN THE LOCATIONS SHOWN ON THE DRAWING.
6. ALL STOP BARS SHALL BE 12" WIDE WHITE STRIPES AND "STOP" TEXT SHALL BE 24" HIGH WHITE LETTERS.
7. THE CONTRACTOR SHALL APPLY TWO COATS OF RED PAINT TO ALL NEW FACE OF PERIMETER CONCRETE CURB.
8. THE COLLEGE SHALL FURNISH AND INSTALL NO PARKING AND PARKING LOT DESIGNATION SIGNAGE.

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Fax: 801.990.3293
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UVSC PARKING LOT V PHASE II

SITE/LOCATION:

UTAH VALLEY
STATE COLLEGE
800 S. 1200 W.
OREM, UTAH

PROJECT TITLE:

PARKING LOT V
PHASE II

MARK	DATE	DESCRIPTION

ISSUE TYPE: CONSTRUCTION SET

ISSUE DATE: MAY 26, 2006

DFCM PROJECT NO: 06227790
CAD PROJECT NO: 02-XXX
CAD DWG FILE: C-104.DWG
DRAWN BY: JEK
CHK'D BY: JEK
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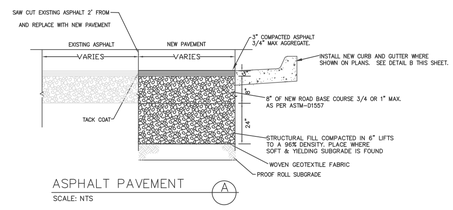
SHEET TITLE

SIGNING AND STRIPING

SHEET NUMBER

C-104

SHEET 5 OF 11



ASPHALT PAVEMENT (A)
SCALE: NTS

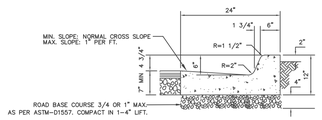
CONCRETE NOTES:

CONCRETE SHALL HAVE AN MINIMUM 28 DAY UNCONFINED COMPRESSIVE STRENGTH OF 4,000 POUNDS PER SQUARE INCH AND CONTAIN 5 PERCENT +/- 1PERCENT

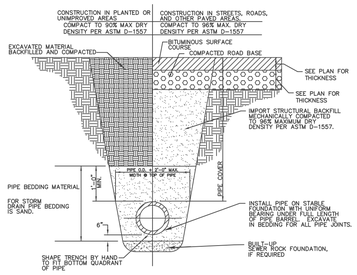
ALL SAW CUTS MUST BE COMPLETED WITHIN 24 HOURS OF THE "INITIAL SET" OF THE CONCRETE AND SHOULD BE PERFORMED UNDER THE DIRECTION OF THE CONCRETE

INCLUDE PRO MESH FIBER MESH IN ALL CONCRETE MIX OR APPROVED EQUAL. ADD AT 1.5 LBS PER CUBIC YARD OF MIX. MIX WELL FOR A MINIMUM OF 5 MINUTES BEFORE PLACING. SEE SPECIFICATIONS FOR MIX REQUIREMENTS.

PLACE EXPANSION JOINTS AT ALL LOCATIONS WHERE NEW CONCRETE IS ABUTTING EXISTING CONCRETE PADS. PLACE EXPANSION JOINTS AT 40' INTERVALS ON ALL NEW CONCRETE.



RECEIVING CURB AND GUTTER (B)
SCALE: NTS



TYPICAL TRENCH (E)
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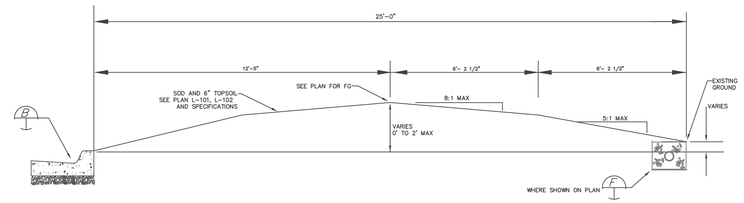
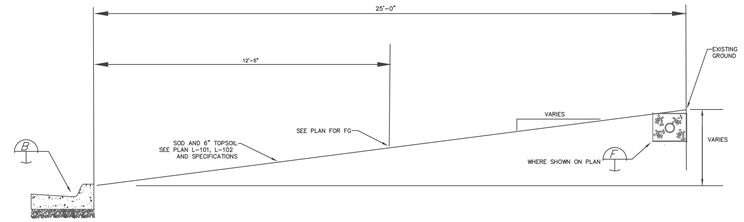


TYP. SECTION CROWNED BERM (I)
SCALE: NTS



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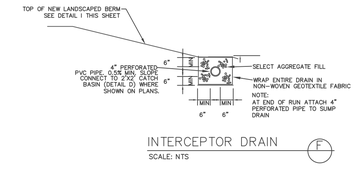

INTERCEPTOR DRAIN (F)
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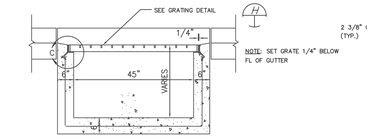
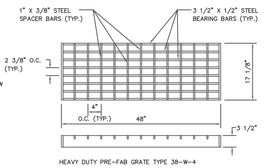
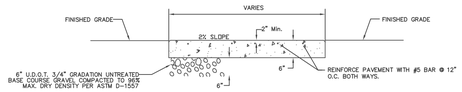


SECTION B-B



HEAVY DUTY PRE-FAB GRATE TYPE 38-W-4

DRAINAGE GRATE (H)
SCALE: NTS



CONCRETE ENTRY (G)
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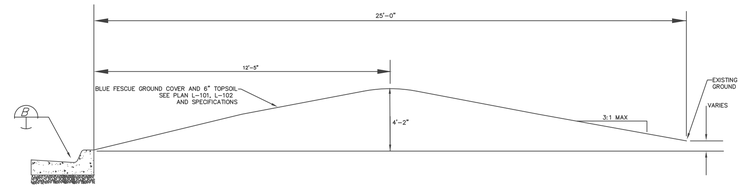

TYP. SECTION HIGH CROWNED BERM (K)
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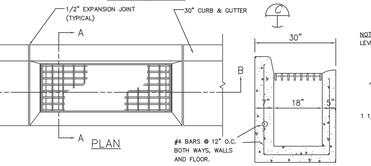

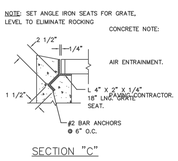

CURB INLET BOX (C)
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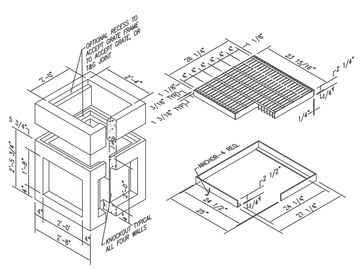
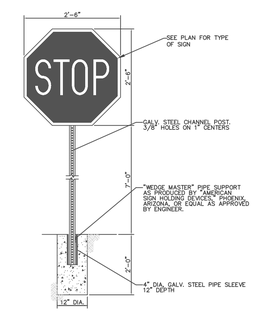
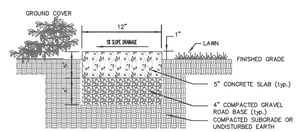


2' X 2' INLET BOX (D)
SCALE: NTS



SIGN, POST AND BASE (H)
SCALE: NTS



CONCRETE MOW STRIP (L)
SCALE: NTS

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Salt Lake City, Utah 84121
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UVSC PARKING LOT V PHASE II

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DFCM PROJECT NO: 06227790
CAD PROJECT NO: 02-XXX
CAD DWG FILE: C-501.DWG
DRAWN BY: JEK
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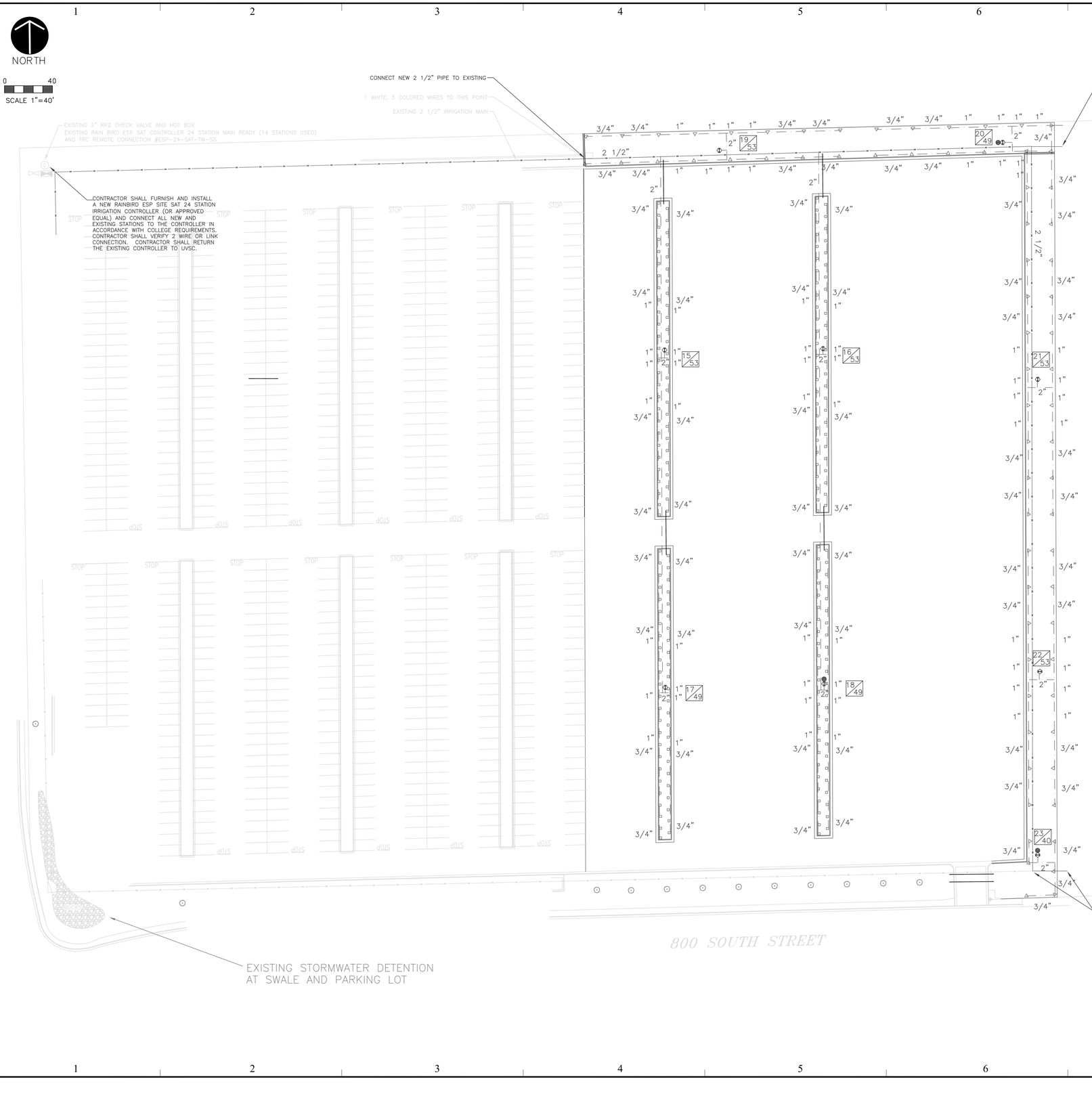
SHEET TITLE

CIVIL DETAILS

SHEET NUMBER

C-501

SHEET 6 OF 11



NOTES AND LEGEND

- EXISTING 2" WATER METER
- EXISTING 2" RPZ CHECK VALVE AND HOT BOX
- (C) EXISTING RAIN BIRD ESP SAT CONTROLLER 24 STATION MAXI READY AND TRC REMOTE CONNECTION #ESP-24-SAT-TW-SS
- ■ RAIN BIRD 1804 PRS HEAD W/FUNNY PIPE CONNECTIONS 10' Q
- □ RAIN BIRD 1804 PRS HEAD W/FUNNY PIPE CONNECTIONS 10' H
- △ TORO 300 STREAM ROTORS W/FUNNY PIPE CONNECTIONS
- ● RAIN BIRD 44Q QUICK COUPLER W/ 6" ROUND VALVE BOX
- Φ RAIN BIRD PEB 2" AUTOMATIC VALVE W/ STD VALVE BOXES
- 2" & 2 1/2" SCH 40 PVC MAIN LINE W/ 14 GA. WIRE RUN ALONG SIDE
- 3/4" THRU 2" SCD 40 PVC AS MARKED

1. THE IRRIGATION CONTRACTOR MUST EXAMINE THE SITE CONDITIONS UNDER WHICH THE WORK IS TO BE PREFORMED AND NOTIFY THE ARCHITECT IN WRITING OF UNSATISFACTORY CONDITIONS. DO NOT PROCEED UNTIL CONDITIONS HAVE BEEN CORRECTED.

2. IT IS THE RESPONSIBILITY OF THE IRRIGATION CONTRACTOR TO BE FAMILIAR WITH ALL GRADE DIFFERENCES, LOCATION OF WALKS, RETAINING WALLS STRUCTURES AND UTILITIES. THE IRRIGATION CONTRACTOR SHALL REPAIR OR REPLACE ALL ITEMS DAMAGED AND SHALL COORDINATE WITH OTHER CONTRACTORS FOR THE LOCATION, INSTALLATION AND MARKING OF PIPE SLEEVES UNDER WALKS AND THROUGH WALLS.

3. BEFORE ANY TRENCHING, EXCAVATION OR DIGGING FOR ANY REASON, THE CONTRACTOR SHALL HAVE THE AREA BLUE STAKED IN ORDER TO DETERMINE THE LOCATION OF UNDERGROUND UTILITIES. THE CONTRACTOR SHALL CONDUCT THE WORK IN SUCH A MANNOR TO PROTECT ALL UTILITIES FROM DAMAGE. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO REPAIR OR REPLACE ANY DAMAGE CAUSED BY THIS WORK AT NO EXPENSE TO THE OWNER.

4. THE IRRIGATION SYSTEM DESIGN IS BASED ON A MINIMUM OPERATING PRESSURE AT THE MAIN CONNECTION OF 50 PSI AND A MAXIMUM FLOW DEMAND OF 55 GPM. THE IRRIGATION CONTRACTOR SHALL VERIFY WATER PRESSURE AND FLOW RATES PRIOR TO CONSTRUCTION. REPORT ANY DIFFERENCES BETWEEN THE WATER PRESSURE INDICATED ON THE DRAWINGS AND THE ACTUAL PRESSURE READING AT THE IRRIGATION POINT OF CONNECTION TO THE ARCHITECT IN WRITING.

5. DO NOT WILLFULLY INSTALL THE SPRINKLER SYSTEM AS SHOWN ON THE DRAWNGS WHEN IT IS OBVIOUS IN THE FIELD THAT UNKNOWN OBSTRUCTIONS, GRADE DIFFERENCES OR DIFFERENCES IN THE AREA DIMENSIONS EXIST THAT MIGHT NOT HAVE BEEN CONSIDERED IN THE ENGINEERING. SUCH OBSTRUCTIONS OR DIFFERENCES SHOULD BE BROUGHT TO THE ATTENTION OF THE ARCHITECT IN THE EVENT THIS NOTIFICATION IS NOT PERFORMED, THE IRRIGATION CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR ANY REVISION NECESSARY.

6. ALL SPRINKLER EQUIPMENT NOT OTHERWISE DETAILED SHALL BE INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS AND SPECIFICATIONS.

7. CONTRACTOR TO ENSURE POSITIVE DRAINAGE OF THE ENTIRE SYSTEM. PROVIDE A MANUAL DRAIN VALVE AS DETAILED ON ALL MAINLINES AT EACH VALVE CLUSTER, AT ALL LOW POINTS AND EDGES OF PAVEMENT. THE LOCATION OF ALL MANUAL DRAIN VALVES SHALL BE NOTED ON THE RECORD DRAWINGS.

8. THE IRRIGATION CONTRACTOR SHALL FLUSH AND ADJUST ALL THROTTLE CONTROLS ON ALL SPRINKLER HEAD AND ADJUST VALVES FOR OPTIMUM COVERAGE WITH MINIMAL OVER SPRAY ONTO WALKS, STREETS, WALL, ETC.

9. LOCATE ALL HEADS NEXT TO WALKS A MINIMUM OF 2" FROM EDGE OF WALKS, PAVEMENTS, CURBS, ETC. AND SET 1/4" BELOW EDGE OF PAVEMENT.

10. ALL SPRINKLER HEADS SHALL BE SET PERPENDICULAR TO THE FINISH GRADE.

11. ALL MAINLINES SHALL BE SCHEDULE 40 PVC BURIED TO A DEPTH OF 18". LATERAL LINES SHALL BE SCHEDULE 40 PVC BURIED TO A DEPTH OF 12"

12. MAIN AND LATERAL LINES SHOWN ON PLANS ARE DIAGRAMMATIC ONLY. ALL PIPES SHALL BE LAIN IN COMMON TRENCHES WHEN FEASIBLE AND IN SOFT SPACES.

13. PIPE SIZES SHALL CONFORM TO THOSE SHOWN ON THE DRAWINGS. NO SUBSTITUTIONS OF SMALLER PIPE SIZES WILL BE APPROVED. ALL DAMAGED AND REJECTED PIPE SHALL BE REMOVED FROM THE SITE IMMEDIATELY.

14. ALL MAINLINE PIPE AND CONTROL WIRES UNDER PAVING SHALL BE INSTALLED IN SEPERATE SLEEVES.

15. THE IRRIGATION CONTRACTOR SHALL SUPPLY THE OWNER OR THE OWNER'S AGENT, AT FINAL INSPECTION WITH COMPLETE RECORD DRAWINGS, WRITTEN START-UP AND SHUT-DOWN PROCEDURES. A COMPLETE MATERIALS SUPPLY LIST AS WELL AS NAMES, ADDRESSES AND PHONE NUMBERS OF THE CONTRACTORS AND THE LOCAL DISTRIBUTORS OF THE VARIOUS MATERIALS USED.

16. 1/2" KING DRAINS FOR PROPER DRAINAGE

17. 3/4" THRU 2" SCH. 40 PVC PIPING.

18. 1/2" FUNNY PIPE CONNECTIONS.

19. 2" ISOLATION AT EACH VALVE BOX

20. PLACE 6" SLEEVES BETWEEN ISLANDS AND BERMS

21. INSTALLATION MUST BE APPROVED BY UVSC WATER-MASTER (RUSS CLEGG 362-9515)

22. INSTALL ALL CONTROL VALVES IN ACCORDANCE WITH DETAIL A SHEET EL-101, ALL MANUAL DRAIN VALVES IN ACCORDANCE WITH DETAIL B SHEET EL-101, ALL POP UP HEADS IN ACCORDANCE WITH DETAIL C SHEET EL-101, AND ALL IRRIGATION PIPE IN ACCORDANCE WITH DETAIL D SHEET EL-101.

23. UVSC SHALL INSPECT ALL TRENCHES, PIPES AND HEADS BEFORE BURIAL. CONTRACTOR SHALL FOLLOW UVSC CAMPUS STANDARDS ON ALL LANDSCAPE AND IRRIGATION IN ADDITION TO THE SPECIFICATIONS AND THIS PLAN.

King Engineering, Inc.
2825 E Cottonwood Parkway
Salt Lake City, Utah 84121
Phone: 801.990.3170
Fax: 801.990.3293
Internet: www.pavementmanagement.com

CREATED BY: KING ENGINEERING, INC.

UVSC PARKING LOT V PHASE II

SITE/LOCATION:

UTAH VALLEY
STATE COLLEGE
800 S. 1200 W.
OREM, UTAH

PROJECT TITLE:

PARKING LOT V
PHASE II

MARK	DATE	DESCRIPTION

ISSUE TYPE: CONSTRUCTION SET

ISSUE DATE: MAY 26, 2006

DFCM PROJECT NO: 06227790
CAD PROJECT NO: 02-XXX
CAD DWG FILE: L-101.DWG
DRAWN BY: JEK
CHKD BY: JEK

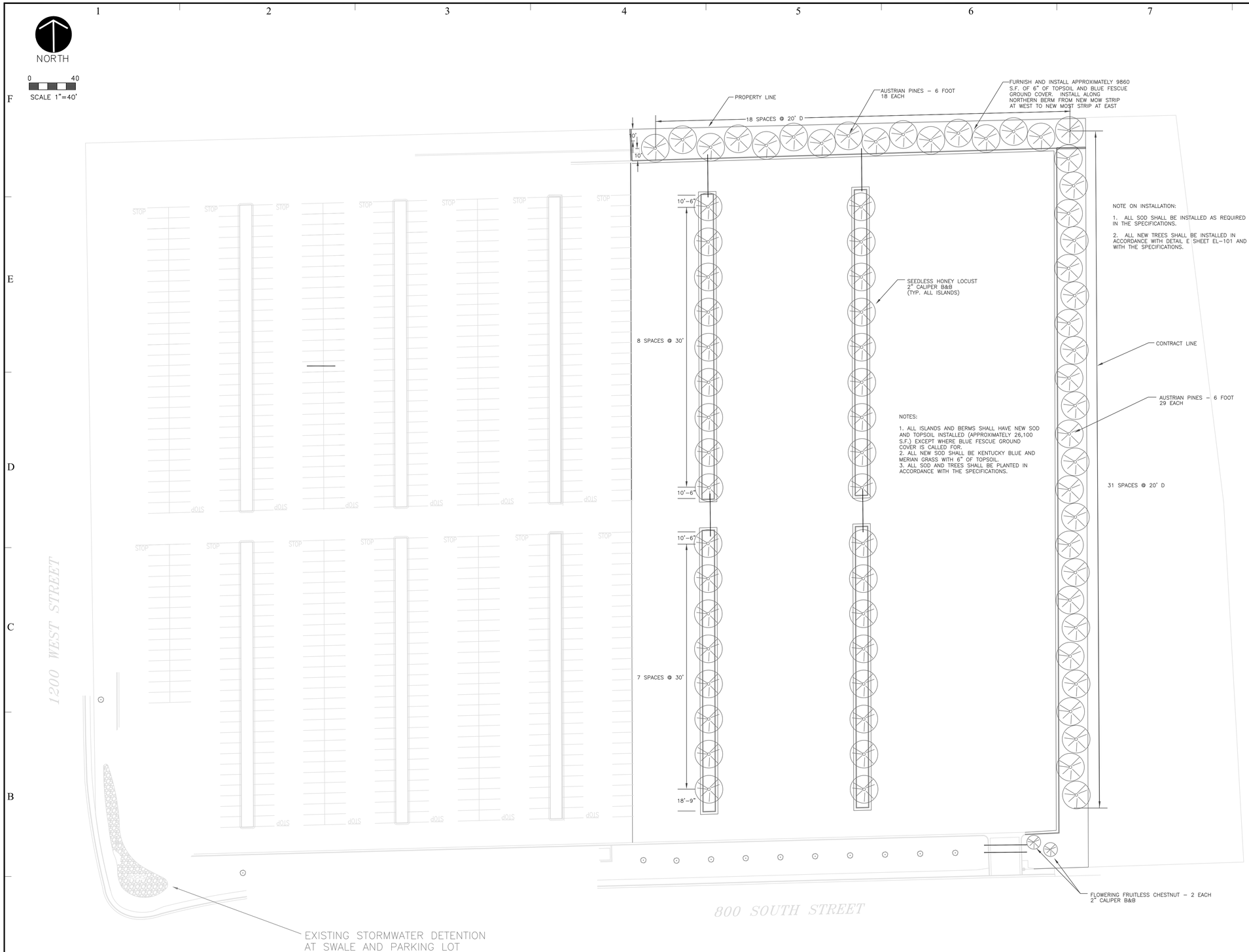
SHEET TITLE

IRRIGATION PLAN

SHEET NUMBER

L-101

SHEET 7 OF 11



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Salt Lake City, Utah 84121
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PHASE II

MARK	DATE	DESCRIPTION

ISSUE TYPE: CONSTRUCTION SET

ISSUE DATE: MAY 26, 2006

DFCM PROJECT NO: 06227790
CAD PROJECT NO: 02-XXX
CAD DWG FILE: L-102.DWG
DRAWN BY: JEK
CHKD BY: JEK

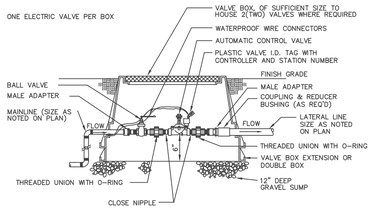
SHEET TITLE

LANDSCAPE
PLAN

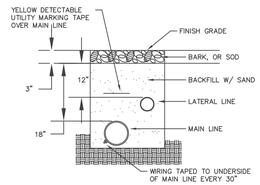
SHEET NUMBER

L-102

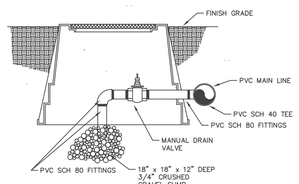
SHEET 8 OF 11



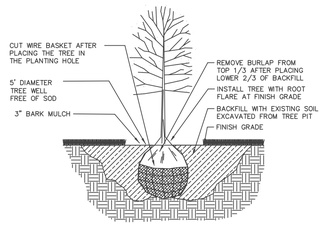
AUTOMATIC
CONTROL VALVE
SCALE: NTS (A)



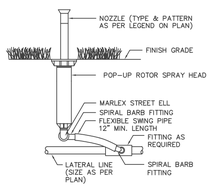
MAINLINE TRENCH
SCALE: NTS (D)



MANUAL
DRAIN VALVE
SCALE: NTS (B)



TREE PLANTING
SCALE: NTS (E)



POP UP
SPRINKLER HEAD
SCALE: NTS (C)

King Engineering, Inc.
2825 E Cottonwood Parkway
Salt Lake City, Utah 84121
Phone: 801.990.3170
Fax: 801.990.3293
Internet: www.pavementmanagement.com

CREATED BY: KING ENGINEERING, INC.

UVSC PARKING LOT V PHASE II

SITE/LOCATION:

UTAH VALLEY
STATE COLLEGE
800 S. 1200 W.
OREM, UTAH

PROJECT TITLE:

PARKING LOT V
PHASE II

MARK	DATE	DESCRIPTION

ISSUE TYPE: CONSTRUCTION SET

ISSUE DATE: MAY 26, 2006

DFCM PROJECT NO: 06227790
CAD PROJECT NO: 02-XXX
CAD DWG FILE: EL-101.DWG
DRAWN BY: JEK
CHK'D BY: JEK

SHEET TITLE

IRRIGTATION
DETAILS

SHEET NUMBER

EL-101

SHEET 9 OF 11

PANEL NO. "L05" VOLTAGE 120/240 3 WIRE X

SURFACE X FLUSH ____ MOUNTED. TYPE NQOD MAIN BREAKER ____

MAINS ONLY 225 FEED ____ LOCATION ____

AREA SERVED	LOAD	CCT	BKR	A	B	C	BKR	CCT	LOAD	AREA SERVED
EXISTING SPRINKLER CTL PNL		1	20				20	2		GFI OUTLET
NEW SPRINKLER CTL PNL		3	20				20	4		SPARE
		5					20	6		SPARE
37.5 KVA TRANSFORMER		7	200				20	8		SPARE
SPARE		9	20				20	10		SPARE

SN ____

EG ____

NEMA 3R 10,000 AIC

PANEL NO. "H05" VOLTAGE 480 3 WIRE X

SURFACE X FLUSH ____ MOUNTED. TYPE NQOD MAIN BREAKER 100

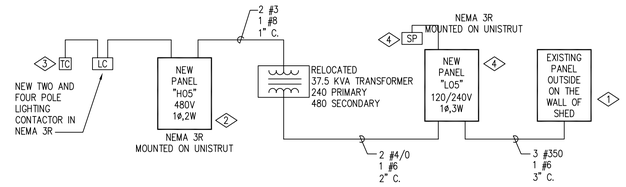
MAINS ONLY ____ FEED ____ LOCATION ____

AREA SERVED	LOAD	CCT	BKR	A	B	C	BKR	CCT	LOAD	AREA SERVED
			100							
EXISTING POLE LIGHTS		1						2		
		3	20				20	4		NEW POLE LIGHTS
SPARE		5						6		
SPARE		7	30				20	8		SPARE
		9	20				20	10		SPARE

SN ____

EG ____

NEMA 3R 10,000 AIC



1. FURNISH AND INSTALL A NEW TWO POLE 200 AMP CIRCUIT BREAKER TO FEED NEW PANEL. THE NEW BREAKER SHALL HAVE THE SAME AIC RATING AS THE EXISTING
2. EXTEND EXISTING 480 VOLT POLE MOUNTED LIGHT FIXTURE CIRCUIT TO THE NEW PANELS THROUGH LIGHTING CONTACTOR. RUN #6 CONDUCTORS. UTILIZE EXISTING UNDERGROUND CONDUIT. FIELD VERIFY.
3. FURNISH AND INSTALL A TWO ZONE DIGITAL ASTRONOMICAL TIME CLOCK IN NEMA 3R ENCLOSURE TO CONTROL EXISTING LIGHTS. PROGRAM THE TIME CLOCK PER OWNERS REQUIREMENTS. PROVIDE CONDUIT, CONDUCTOR, ETC. FOR A COMPLETE INSTALLATION. INTERMATIC, PCI, DOUGLAS AND LEVITION ARE APPROVED MANUFACTURES.
4. FEED THE EXISTING SPRINKLER CONTROL ON NORTH WEST CORNER FROM THE NEW PANEL "L05". UTILIZE #8 WIRES AND EXISTING 2" CONDUIT.

SCALE: N.T.S.

POWER SINGLE LINE DIAGRAM

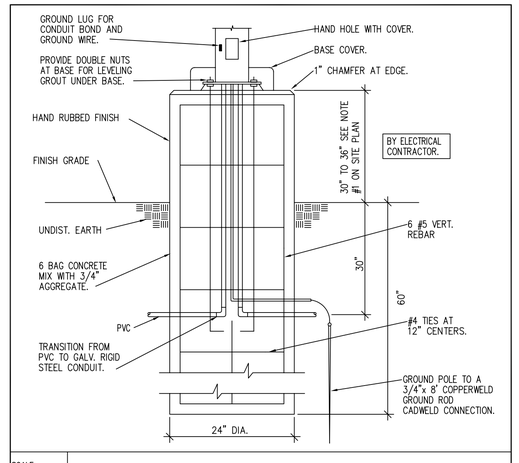
ELECTRICAL SYSTEMS SYMBOL LIST

⊙	POST MOUNTED PARKING OR WALKWAY LIGHTING
⊕	DUPLEX CONVENIENCE OUTLET – 20 AMP GROUND FAULT INTERRUPTER
▨	ELECTRICAL PANEL LOCATION
T	TRANSFORMER
——#——	CONDUITS CONCEALED IN FLOOR OR BELOW GRADE
——#——	CONDUITS CONCEALED IN CEILING AND WALLS
——#——►	ARROWS INDICATE HOME RUNS – LINES INDICATE NUMBER CONDUCTORS
◇X	REFERENCE NOTE CALLOUT

GENERAL NOTES:

1. ALL MATERIALS TO BE REMOVED AND RETURNED TO THE OWNER. MATERIALS WHICH THE OWNER DECIDES NOT TO KEEP SHALL BE SALVAGED AND REMOVED FROM THE SITE BY THE CONTRACTOR.
2. ALL UNUSED CONCEALED CONDUIT THAT CANNOT BE REMOVED SHALL BE CUT FLUSH WITH THE FINISH SURFACES AND CAPPED OFF AFTER THE WIRING HAS BEEN DISCONNECTED AT THE PANEL AND REMOVED FROM THE CONDUIT COORDINATE WITH OWNER.
3. IN AREAS WHERE CIRCUIT CONTINUITY IS INTERRUPTED, BUT MUST BE MAINTAINED BECAUSE OF THE NATURE OF THE FACILITY, MAKE ALL THE NECESSARY MODIFICATIONS TO THE CIRCUITS IN ORDER TO MAINTAIN THE CIRCUIT INTEGRITY.
4. ALL NEW WORK MUST MEET THE CURRENT ADOPTED NATIONAL ELECTRICAL CODE.
5. NOT MORE THAN THREE (3) CIRCUITS, SHALL BE INSTALLED IN A CONDUIT. EACH CIRCUIT SHALL CONSIST OF 1 CONDUCTOR FOR EACH PHASE, 1 NEUTRAL, AND 1 GROUND, FOR A TOTAL OF FIVE CONDUCTORS.
6. ALL METALLIC CONDUITS, JOINTS, FITTINGS, ETC., IN CONTACT WITH THE GROUND SHALL BE SPIRALLY WRAPPED WITH 3M SCOTCHRAP–51, 20 MIL TAPE (OR APPROVED EQUAL). 1/2" OVERLAP IS REQUIRED.
7. ALL CONDUITS EXPOSED TO THE WEATHER AND IN THE BOILER ROOM SHALL BE GALVANIZED RIGID STEEL, UNLESS OTHERWISE NOTED.
8. ALL UNDERGROUND CONDUIT SHALL BE BURIED 24" MINIMUM UNDER THE GROUND.
9. ALL MATERIALS USED IN THIS INSTALLATION SHALL BE U.L. APPROVED AND NEW.
10. ALL PANELS SHALL HAVE COPPER BUSSES AND SHALL BE BRACED FOR A MINIMUM OF 10,000 AIC OR AS SPECIFIED. GE, CUTLER HAMMER AMD SIEMENS ARE THE APPROVED MANUFACTURES.
11. ALL ELECTRICAL WIRING MUST BE IN CONDUIT (ROMEX AND MC CABLE NOT PERMITTED).
12. PRIOR TO SUBMITTING A BID THE ELECTRICAL CONTRACTOR SHALL INSPECT THE SITE AND INCLUDE IN HIS BID PACKAGE ALL CHARGES DUE TO EXISTING CONDITIONS. SHOP DRAWINGS ARE REQUIRED. ALL LABOR, MATERIAL AND WORKMANSHIP SHALL BE GUARANTEED FOR A PERIOD OF 1 YEAR FROM THE DATE OF ACCEPTANCE BY THE TENANT. REPLACE OR REPAIR ALL DEFECTS DURING THE GUARANTEED PERIOD.

    ALL DUPLEX OUTLETS AND SWITCHES SHALL BE 20 AMP., 120 VOLT SPEC GRADE. HUBBELL AND PASS & SEYMOUR AND LEVITON ARE APPROVED MANUFACTURERS.
13.



SCALE: N.T.S.

LIGHT POLE BASE DETAIL (TO MATCH EXISTING)

King Engineering, Inc.
2825 E Cottonwood Parkway
Salt Lake City, Utah 84121
Phone: 801.990.3170
Fax: 801.990.3293
Internet: www.pavementmanagement.com

CREATED BY: KING ENGINEERING, INC.

UVSC PARKING LOT V PHASE II

SITE/LOCATION:

UTAH VALLEY
STATE COLLEGE
800 S. 1200 W.
OREM, UTAH

PROJECT TITLE:

PARKING LOT V
PHASE II

MARK	DATE	DESCRIPTION

ISSUE TYPE: CONSTRUCTION SET

ISSUE DATE: MAY 26, 2006

DFCM PROJECT NO: 06227790
CAD PROJECT NO: 02-XXX
CAD DWG FILE: E101.DWG
DRAWN BY: TB
CHK'D BY: TB

SHEET TITLE

POWER SINGLE LINE DIADRAM & PANELS

SHEET NUMBER

E-001

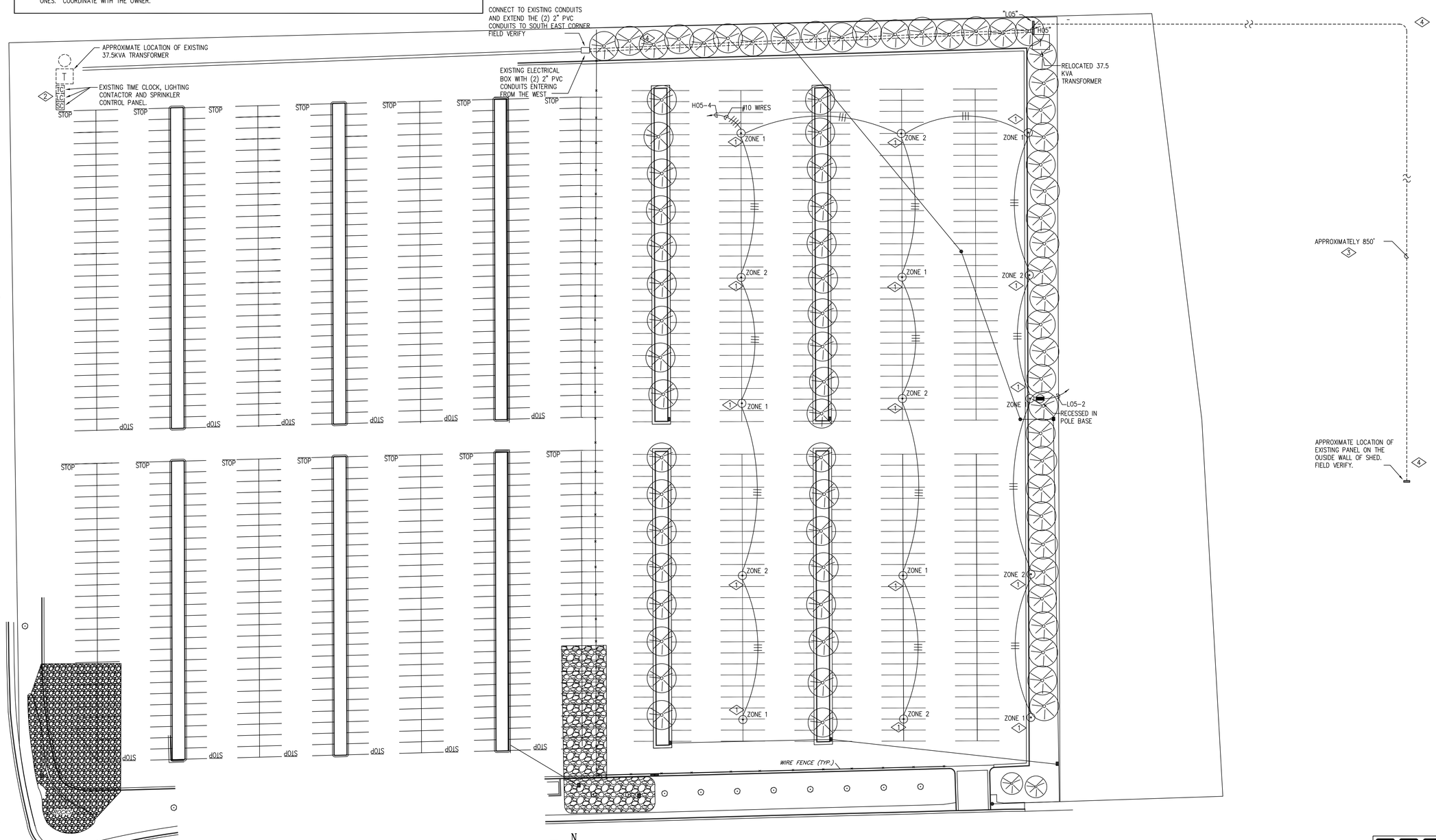
SHEET 10 OF 11

E. C. E. INC., CONSULTING ENGINEERS
939 SO. WEST TEMPLE PHONE: (801) 521-8007
S.L.C., UTAH 84101 FAX: (801) 521-8057

2970

REFERENCE NOTES:

1. FURNISH AND INSTALL NEW POLE MOUNTED LIGHT FIXTURES IN THE APPROXIMATE LOCATIONS SHOWN. TIE THE LIGHT FIXTURES TO A 480 VOLT 20 AMP DEDICATED CIRCUIT THROUGH NEW LIGHTING CONTACTOR, UTILIZE #10 CONDUCTOR IN A 1" CONDUIT. TIE THE LIGHT FIXTURES THROUGH INDICATED ZONE ON TIME CLOCK. PROVIDE ADDITIONAL CONDUITS, CONDUCTORS, ETC., FOR A COMPLETE WORKING INSTALLATION. THE LIGHT FIXTURES SHALL MATCH THE EXISTING ONES IN THE AREA. MOLD CAST-CONTRALCLINE CUBE ON 28' SQ. MOLDCAST STRAIGHT ALUMINUM POLE, DARK BRONZE, POLYESTER PAINT, (MATCH FINISH), 400W METAL HALIDE 480 VOLT BALLAST WITH LAMP. MOUNT TO MOLDCAST BOLT HOLE AND BOLT SPECIFICATIONS. PROVIDE CONCRETE POLE BASE TO MATCH EXISTING. ADJUST EXPOSED BASE HEIGHT TO MAINTAIN TOP OF ALL LIGHT POLES (NEW AND EXISTING) AT THE SAME PLANE OF ELEVATION. MINIMUM BASE HEIGHT 30" TO 36". REMOVE SONO TUBE BEFORE PAVING. PLACE ELECTRICAL WARNING TAPE OVER CONDUIT BEFORE BURIAL. ALIGN THE NEW POLE MOUNTED LIGHT FIXTURES WITH THE EXISTING ONES. COORDINATE WITH THE OWNER.
2. DISCONNECT THE POWER AND REMOVE THE EXISTING PANEL, 37.5 KVA TRANSFORMER, TIME CLOCK/PHOTO CELL AND LIGHT CONTACTOR. RELOCATE THE EXISTING 37.5 KVA TRANSFORMER FROM THE EXISTING LOCATION TO THE NORTH EAST CORNER OF THE PROJECT AS SHOWN. EXTEND CIRCUITS FOR EXISTING POLE MOUNTED LIGHT FIXTURES TO THE NEW PANEL "H05" ON THE NORTH EAST CORNER. REFER TO THE POWER SINGLE LINE DIAGRAM FOR MORE INFORMATION. FIELD VERIFY PRIOR TO BID AND INCLUDE ANY ADDITIONAL DEVICES NECESSARY FOR A COMPLETE INSTALLATION.
3. RUN FEEDER TO PANEL "L05" IN THE APPROXIMATE PATH SHOWN. PATCH AND REPAIR LANDSCAPING. COORDINATE WITH THE OWNER FOR EXACT PATH. FIELD VERIFY FOR EXACT LENGTH.
4. FURNISH AND INSTALL 1" PVC SPARE CONDUIT FROM THE EXISTING PANEL ON OUTSIDE WALL OF SHED TO EXISTING ELECTRICAL BOX. PROVIDE BOXES AT 500' SPACING AND AT NORTHEAST CORNER.



SITE PLAN
SCALE: 1" = 40'-0"

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2825 E Cottonwood Parkway
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SHEET TITLE

ELECTRICAL LAYOUT

SHEET NUMBER

E-101

SHEET 11 OF 11

ECE
E. C. E. INC., CONSULTING ENGINEERS
939 SO. WEST TEMPLE PHONE: (801) 521-8007
S.L.C., UTAH 84101 FAX: (801) 521-8057

2970